INSTRUCTION MANUAL

Surface Salinity Meter

MODEL SSM-21P

- Please keep this instruction manual close at hand of the persons who are in charge of the operation of this product.
- Before operating this product, please read this instruction manual carefully for its correct handling.

No. SSM-AA22504E

Introduction

Thank you for buying the Surface Salinity Meter SSM-21P.
The meter is intended to measure the salinity concentration deposited on the surfaces of steel structures, such as bridges and ships corresponding to PSPC.
PSPC shows “Performance Standard for Protective Coatings“ defined by IMO(International Maritime Organization) .
This meter can be used as a salinity measuring instrument corresponding to PSPC. Because, this meter is proved by the evaluation test based on “NACE SP 0508-2010” which carried out in the independent organization that it is equivalent to an international-standards test method (the Bresle method / ISO 8502-9). In addition, the measurement result in the water-soluble salts <PSPC> mode serves as a value which added contamination factor "4 mg/m^2" of the Bresle-patch to the measured value in the water-soluble salts <ISO> mode.

The meter measures electric conductivity, and can display it as salt concentration conversion measured value by the following three methods.

- The water-soluble salts <PSPC> concentration measured value based on IMO/PSPC.
- The water-soluble salts <ISO> concentration measured value based on ISO 8502-9.
- Salt concentration measured value converted into sodium chloride concentration.

The measurement related to shipbuilding should use PSPC mode. And, use other than shipbuilding should choose other measurement modes. At the same time, in order to perform compatible measurement with old model "SSM-14P", please use the Sodium chloride mode.

This instruction manual describes important instructions and information including precautions and operational procedures to use the meter safely. Problems or damage resulting from use departing from the instructions or descriptions are not subject to the warranty. If you need help for the operation of the meter, this manual may give a solution. Please keep this manual handy.
If the manual is lost or damaged to the extent that can be illegible, please order a new manual from your authorized distributor, telling the product name and model.

Please note that:

- The figures and the indications shown on the display, illustrated in the manual are just examples for description and can be different in practice.
- Specifications are subject to change without notice in order to enhance the quality of the product.
-

For Safe Use

Notes on Safety

WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against practices that may cause damage to property.

In addition, the following symbols may be indicated in combination with the above signal word to represent the hazardous situation that could/may occur.

	### Special emphasis This symbol, if noted by an instruction in this manual, indicates that the instruction should be ensured.
	### Forbidden act This symbol, if noted, indicates an forbidden action or operation.
	### Electrical shock may occur This symbol, when noted on the product, indicates that a risk of electrical shock exists.
	### Flammable and firing may occur This symbol, if noted on the product, indicates that a risk of firing or ignition exists.
	### Explosion may occur This symbol, if noted on the product, indicates a risk of explosion exists.
	### Corrosion may occur This symbol, if noted on the product, indicates a risk of corrosion exists.
	### Fingers may be caught This symbol, if noted on the product, your fingers may be caught.
	### Under control of WEEE Directive in Europe This symbol, if noted on a product, indicates that product is under control of WEEE (Waste Electrical and Electronic Equipment) directive and cannot be disposed of in Europe. When the product is used in Europe, please recycle or reuse the product in accordance with relevant regulations and laws of your country and local government.

Operational Precautions

● When an abnormal event is encountered

WARNING	
	If you find an abnormal event, immediately turn off the power. If you find an abnormal operation or smell something burning, an abnormal event may occur inside. Immediately turn off the power and make contact with your local DKK·TOA sales office or your authorized distributor. Do not attempt to repair the instrument by yourself. It could result in danger.

● Precautions in Use

WARNING	
	Do not operate the instrument in an atmosphere of flammable or combustible gas. Ignition or firing could occur.
	Do not disassemble the instrument or attempt to repair it. Otherwise, electrical shock or other abnormal events could result.
	When the measuring Cell or the output terminal cover is removed, the meter is in a state where water easily comes into the instrument. Do not water the instrument or operate the instrument with wet hands. For measurement, ensure that the output terminal cover is properly attached to the meter.
	Do not touch the inner wall of the measuring cell for handling. The rotation of the stirrer may catch and injure your finger.
	When putting the measuring cell to a surface to be measured, do not put your finger to the surface. Fingers could be caught because the measuring cell is strongly drawn to the steel surface by the magnetic force of the cell.
	Before measurement, make sure that no optional device is connected to the meter. Unnecessary electrical connection may cause a malfunction.

● Miscellaneous

For operating the instrument, keep the following precautions and writings in mind.

- Be careful not to bring the meter and the measuring cell into contact with chemical regents or organic solvents. Such substances may cause problems, discoloration or deformation of the instrument. Should the instrument come into contact with such a substance, immediately wipe it dry.
- Do not rub or scratch the display or control key buttons with anything sharp or hard. Scratches may arise on the surface, or the meter may be broken.
- For insertion and extraction of the measuring cell plug, make sure that the meter is in an off-sate or in a stand-by state.
- Do not frequently repeat the insertion and extraction of the plug.
- For installation and removal of connection cables, make sure that the power to the meter is in an off-state.
- Only a dedicated measuring cell is available for the meter.

Installation/Storage Precautions

WARNING	
	Do not store or install the instrument in an atmosphere of flammable or combustible gas. Ignition or firing could occur.
	Do not store or install in a place where water or chemicals may splash over the instrument. The enclosure of the instrument may be discolored or deformed, or short-circuit may occur to result in operational failure.
	Remove the batteries for long-term storage. The leak of the battery can cause internal corrosion of the instrument.

● Other Precautions for Installation/Storage

For installing and storing the instrument, keep the following precautions and writings in mind.

- Keep the instrument in an environment at a temperature of 0 to 40°C and a humidity of 0% to 85%.
- Avoid condensation.
- Do not keep the instrument in environment where a corrosive gas can be produced.
- Avoid vibration.
- Avoid dust and suspended matter in the air.
- Do not leave the instrument in an imbalanced or dangerous place, and take care not to give a strong impact or drop the instrument.
- Avoid storing the instrument by the heater, such as stove, or in an extremely cold place.
- Avoid direct blowing on the instrument from the air conditioner.

Chemical Precautions

CAUTION	
	Before using chemicals, carefully read precautions described on the bottle of the chemicals and MSDS's. Should an irritant chemical come into contact with the skin or eyes, rinse the skin or flush the eyes sufficiently with running water, and consult a doctor or a pharmacist. Wear appropriate protective equipment, such as protective glasses and protective gloves, if necessary.

Transport/Transfer Precautions

For transferring or transporting the instrument, keep the following precautions and writings in mind.

- For packing the instrument for transport, be sure to use the box and the packing material used for supply. Damage and failure in use of other packing materials is not subject to the warranty.

Disposing of Instrument and Used Batteries

For disposing of the instrument or used batteries, be sure to comply with all laws and regulations of your local government. For more information, contact your local government.

WARNING

Do not throw the instrument into fire or burn it.

Explosion or burst may occur.

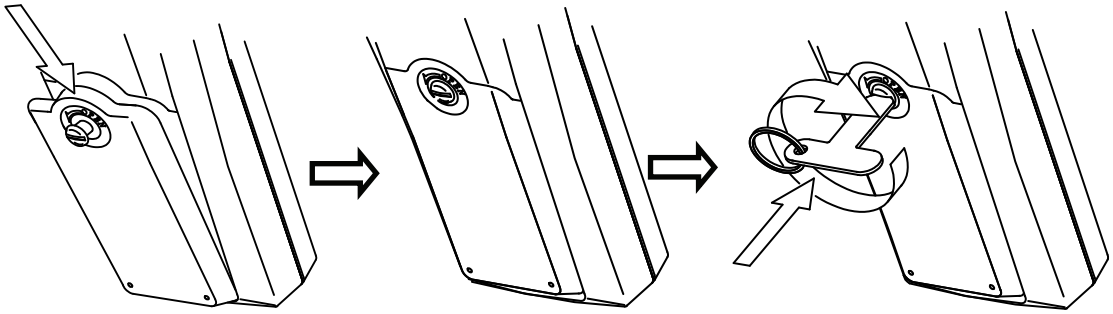
CAUTION

In Europe, the instrument and used batteries cannot be disposed of as waste. When the instrument is used in Europe, please recycle or reuse the product in accordance with relevant regulations and laws of your country and local government.

Precautions for Mating Covers

(1) Mating Battery Cover

1. Make sure that the silicone packing is properly fitted in the groove of the meter with which the battery cover is to be mated. (If the silicone packing is removed from the groove, attach it correctly.)
2. Make sure that the silicon packing has not flaw, and that dust or other foreign matter is not attached.
3. Then, properly mate the battery cover to the meter body, as shown in the figure below.

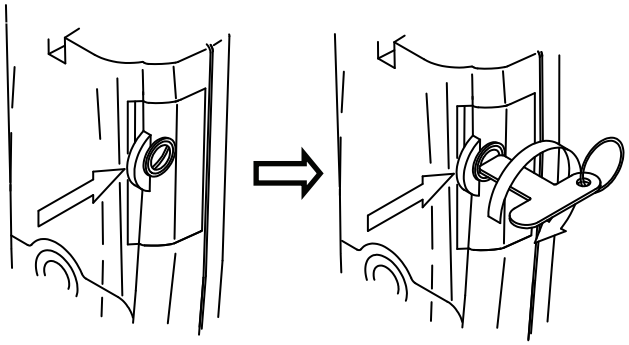


Put the cover to the meter body with press in the arrow direction.

Push the screw into the body with the supplied screwdriver. Turn the screwdriver tightly.

(2) Mating Output Terminal Cover

1. Make sure that silicone packing is properly fitted in the groove of the output terminal cover. (If the silicone packing is removed from the groove, attach it correctly.)
2. Make sure that the silicon packing has not flaw, and that dust or other foreign matter is not attached.
3. Then, properly mate the output terminal cover, as shown in the figure below.



Put the cover to the meter body with press in the arrow direction.

Push the screw into the body with the supplied screwdriver with the output terminal cover pressed in the arrow direction.
Turn the screwdriver tightly.

WARRANTY

Thank you for buying DKK·TOA's product.
The product has passed delivery inspections and satisfies predetermined specifications. We believe that the product can be used for a long term.
DKK·TOA Corporation warrants the product against any defects that are due to faulty material or workmanship for a period of one year from the date of purchase. In the event that a defect is discovered during the warranty period, DKK·TOA Corporation will immediately repair the defective product under our responsibility.

Limitations

Even during the warranty period, repair cost will be charged for defects resulting from the following reasons:

1. Troubles and damage caused by improper application, installation, storage or transfer departing from the instructions described in the instruction manual, product specification, or maintenance manual;
2. Troubles and damage caused by repair or alteration performed by a person other than qualified individuals designated by TOA·DKK;
3. Damage cause by acts of God and natural disaster, such as earthquake, storm and flood damage and lightning strike; and
4. Supply or replacement of consumables.

DKK·TOA Corporation
1-29-10, Takadanobaba, Shinjuku-ku, Tokyo 169-8648, Japane
TEL: +81-03(3202)0211

Contents

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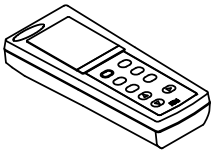
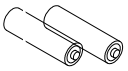
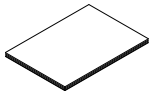
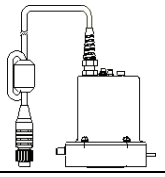
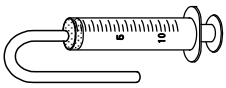
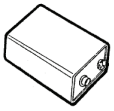
1. Parts in Package

Section	Name	Model/Code	Number	Appearance
Meter	Surface Salinity Meter	SSM-21P	1	
	Screwdriver	0OZ00001	1	
	Neck strap	0TC00001	1	
	LR6/AA battery *1 (free sample for the meter)	—	2	
	Instruction Manual (SSM-21P)	—	1	
Measuring cell	Measuring cell	ELC-006	1	
	Injection syringe (10 mL) With tube *3	—	1	
	6F22 battery *2 （free sample for measurig cell）	—	1	
	Chink sheet	7136300K	1	
	Conductivity cell check solution 0.01 mol/kg （100 mL）*4	—	1	

otes	*1. The batteries supplied are just free samples. The lifetime may be shorter than expected. *2. 6F22 battery is a 9V manganese cell. Its corresponding alkaline battery is 6LF22. (For replacement of the batteries, prepare commercially available batteries.) *3. For additional order of the injection syringe, a package of five syringes (code No.: 7148470K) is available. *4. For additional order of solution 0.01 mol/kg, a package of four bottles (code No.: 143A144) is available.

2. Specifications

[1] Meter

Model		SSM-21P
Measuring method		Electric conductivity measurement
Measurement modes		1. Determining water-soluble salts<PSPC> 2. Determining water-soluble salts<ISO> 3. Determining Sodium chloride 4. Measuring electric conductivity
Measure-ment Range	Water-soluble salts<PSPC> Water-soluble salts<ISO>	0-199.9 mg/m^2 0-1999 mg/m^2 (automatic ranging)
	Sodium chloride	
	Electric conductivity	0-199.9 μS/cm 0-1.999 mS/cm (automatic ranging)
	Temperature	0-50°C (32-122°F) (Display range：0-99.9°C/32-212°F)
Automatic temperature compensation (ATC) ranage		0-50°C (32-122°F) Reference temperature: 25°C (77°F)
Temperature coefficient		2.0%/°C （fixed）
Printer*		Option (standard specification: equipped with only printer interface)
RS-232C interface*		Standard equipment
Data memory		300 sets of measurements (time, salt concentration, temperature)
Measurement time options		1 minute, 3 minutes, 0 minutes (continuous)
Cell constant		Automatically input from measuring cell (manual input available)
Operation temperature/humidity		0-40°C/0-85%
Power source		2 LR6 (AA) batteries Supply voltage：DC2.5～3.3V, Current rating：Max.43mA
Dimensions (not including protrusion)		About 187.5 (L) × 37.5 (H) × 75 (W) mm
Weight		About 310 g (including batteries)

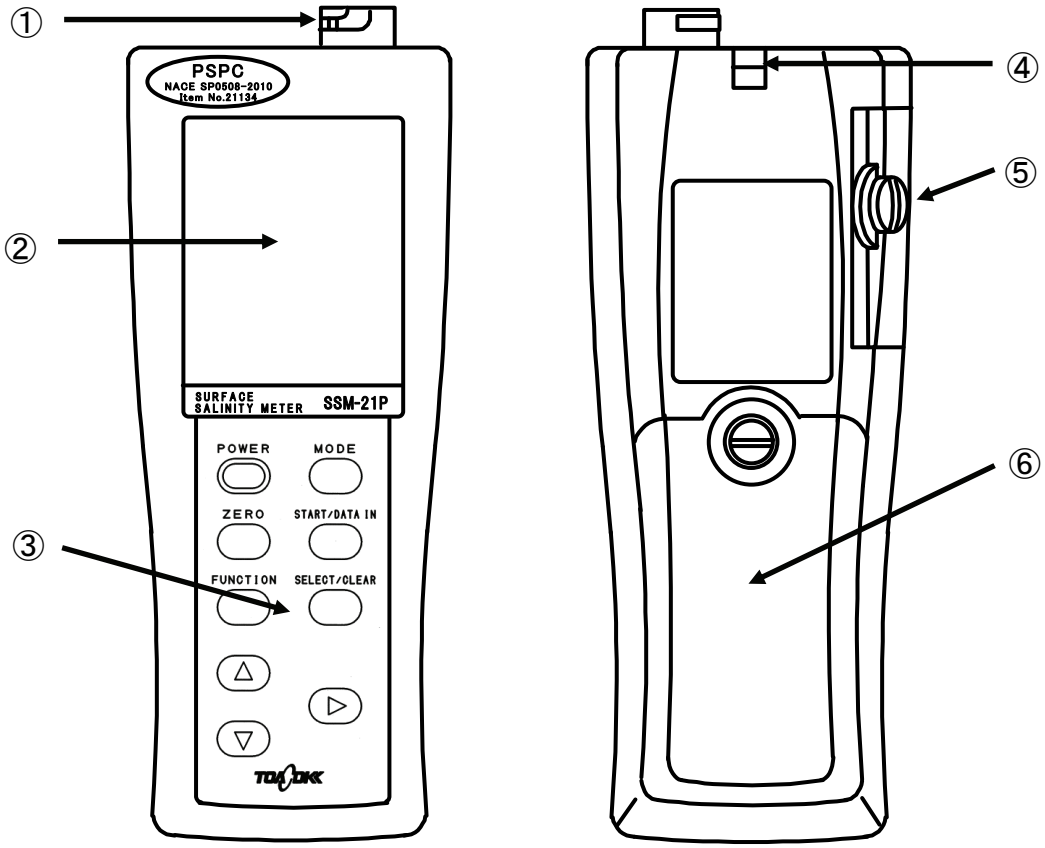
*: Select either.　Cannot select both.

[2] Measuring Cell

Model	ELC-006
Electrode material	SUS316
Measuring area	1250 mm^2
Required sample volume	10 mL
Stirrer	Stirring bar directly connected to a motor
Cable length	About 1 m
Stirrer power source	6F22 or 6LF22 battery Supply voltage：DC7.2～9.7V　Current rating：Max. 350mA
Weight	About 680 g (including battery)

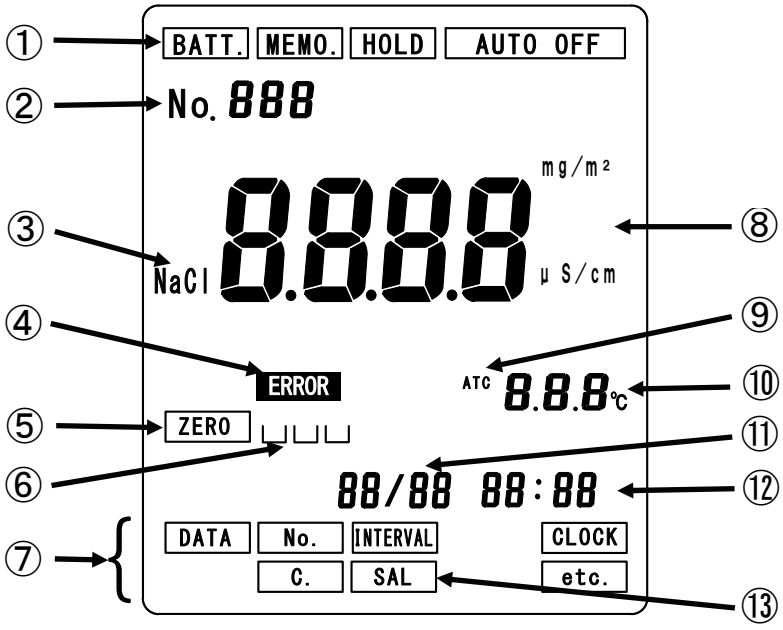
3. Parts and Sections

[1] Meter and Control Keys



①	Cell connector	
②	Display	
③	Control Keys	
	POWER key	If pressed, the meter is turned on or off.
	MODE key	If pressed, a measuring mode is selected from the three modes: determining water-soluble salts <PSPC> or <ISO>; measuring electric conductivity; and determining sodium chloride.
	ZERO key	Used for zero correction for the electric conductivity of pure water used for measurement.
	START/DATA IN key	If pressed, measurement starts, or the current reading is stored in the memory of the meter in continuous measurement.
	FUNCTION key	If pressed, a function is enabled or disabled.
	SELECT/CLEAR key	If pressed, an option is enabled or disabled.
	▲▼► keys	Used to selects numbers or functions.
④	Strap link	
⑤	Output terminal cover (output terminals are used for connection to an optional printer or a personal computer.)	
⑥	Battery cover	

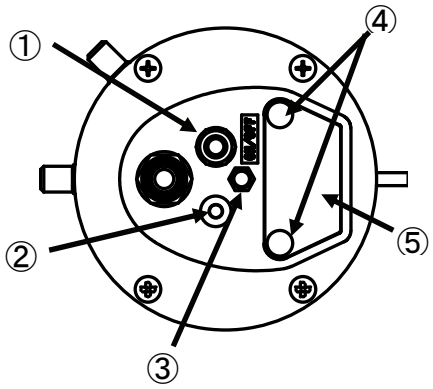
[2] Display



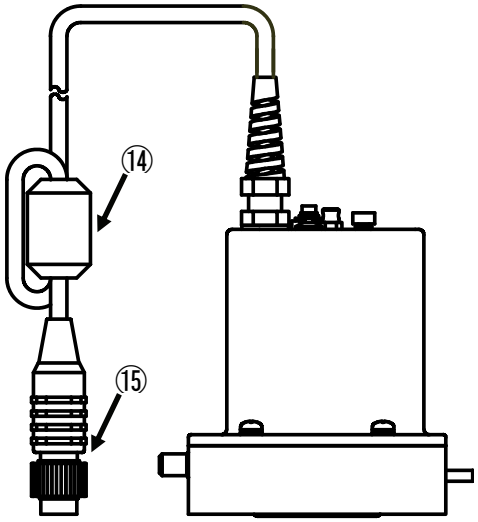
①	Indicates which state the instrument is in.	
	BATT.	Indicated if the batteries in the meter are exhausted and need replacing.
	MEMO.	Indicated if a measuring cell containing an on-board memory is connected to the meter.
	HOLD	Indicated while the reading is held. The key operation is limited in this state.
	AUTO OFF	Indicated while the automatic power-off function is enabled.
②	Indicates the data number (1 to 300).	
③	This sign indicates that the sodium chloride measurement mode is selected.	
④	This sign indicates that some error has arisen.	
⑤	This sign indicates that adjustment with pure water has been performed.	
⑥	If this sign is shown with ⑬SAL, the water-soluble salts <PSPC> measurement mode is selected.	
⑦	These indications appear when the FUNCTION key has been pressed.	
	DATA	If pressed, you can see stored data.
	No.	If pressed, you can set the data memory number.
	INTERVAL	If pressed, you can select a measurement time option.
	CLOCK	If pressed, you can correct the date and time.
	C.	If pressed, you can confirm or input the cell constant.
	etc.	If pressed, other functions become available, including the setting for disabling the automatic power-off function.
⑧	Reading. The unit depends on the measurement mode: mg/m^2 for water-soluble salts or sodium chloride mode; and µS/cm for electric conductivity mode.	
⑨	If indicated, the reading is automatically compensated with temperature.	
⑩	Sample temperature. When Fahrenheit temperature is indicated, the unit (°F) is not shown.	
⑪	Date (month/date).	
⑫	Time instant. During measurement, the measurement time is counted down.	
⑬	If indicated, the water-soluble salts<ISO> or the water-soluble salts<PSPC> measurement mode is selected.	

[3] Measuring Cell ELC-006

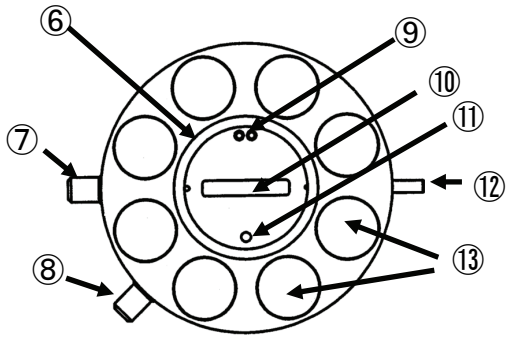
<Top View>

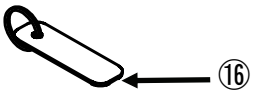


<Side View>



<Bottom View>



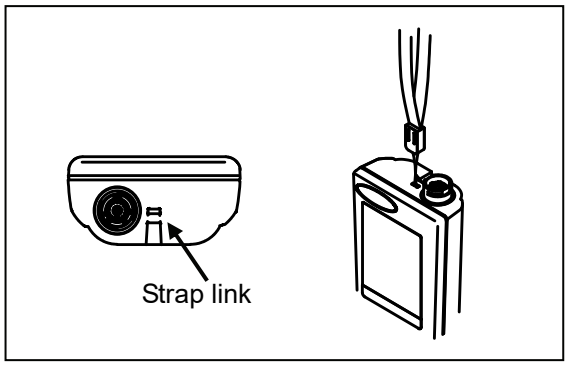


	Name	Description
①	Stirrer switch	If pressed, the stirrer is turned on or off.
②	LED	If lighting, the stirrer is spinning.
③	Strap link	To which the strap is joined to prevent the cell from falling down. Normally, the cell is delivered with the strap connected.
④	Fixing screws	Fixes the battery cover.
⑤	Battery cover	For replacing the battery, remove the cover.
⑥	O-ring	Brought into close contact with the surface to be measured.
⑦	Air vent valve 1	Used for measurement of floor surfaces or walls.
⑧	Air vent valve 2	Used for measurement of walls. (Use the Chink sheet to measure the ceilings.)
⑨	Electrodes	Measures electric conductivity.
⑩	Stirrer	Stirs sample solution by spinning.
⑪	Temperature sensor	Measures the sample temperature.
⑫	Inlet	To which the injection syringe filled with pure water is to be joined.
⑬	Fixing magnet	Fixes the measuring cell on the surface to be measured.
⑭	Ferrite Core	Noise Filter. Don't remove.
⑮	Cell plug	Will be connected to the cell connector.
⑯	chink sheet	Used for measurement of ceilings. Joined to the strap.

4. Preparation

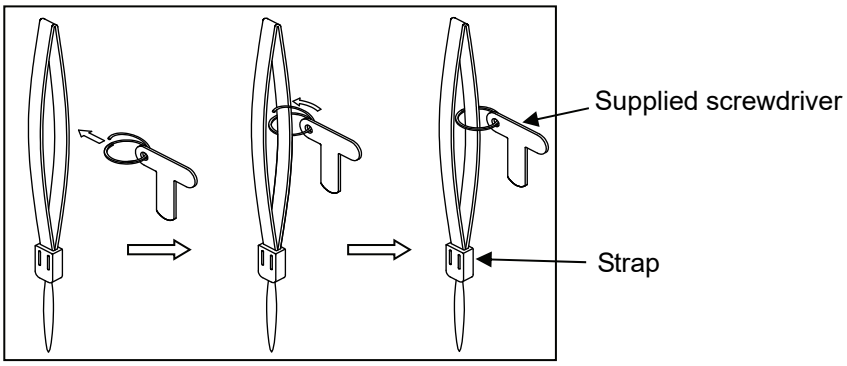
4. 1 Joining Strap to Meter

Join the strap to the meter in the same manner as the hand strap of the cellular phone, as shown in the figure below.



4. 2 Joining Screwdriver

Join the supplied screwdriver for mating or removing the battery cover and the output terminal cover to the strap.

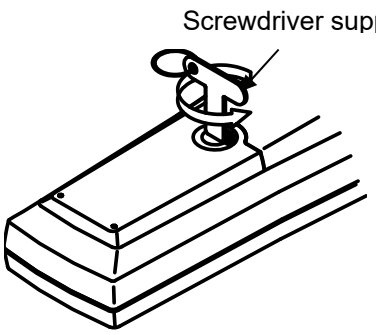


* The measuring cell strap has been joined to the cell before shipping.

4. 3 Installing Batteries

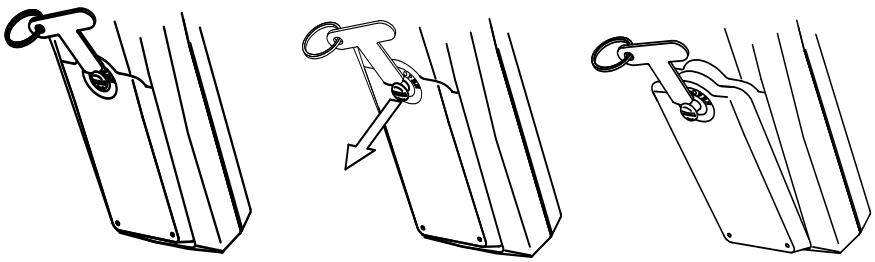
[1] Into Meter

* Two LR6 (AA) batteries are used. The supplied batteries are just free samples. Note that the lifetime may be much shorter than expected.

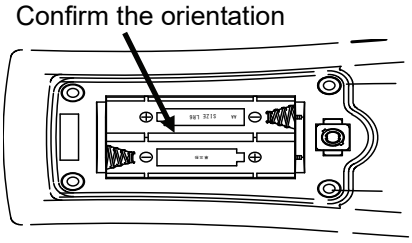


1. Turn the screws of the battery cover by 180° in the arrow direction to loosen them with the supplied screwdriver.

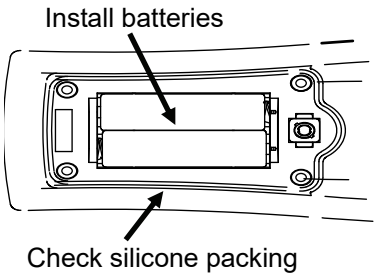
2. Turn the meter body upside down so that the battery cover faces down, and the screw head will protrude. Pull the screw with fingers or with the supplied screwdriver as shown in the figure below, and remove the cover.



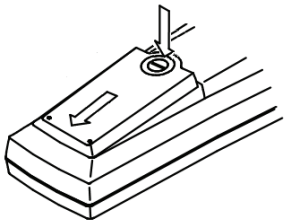
3. Confirm the orientation of the batteries.



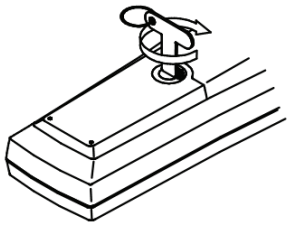
4. Install two LR6 (AA) batteries in the battery chamber. Alkaline batteries can run for about 50 hours. The lifetime of the battery depends on the product and the environment.



5. Catch the lugs of the battery cover with the body case, and press the cover down, pushing it in the arrow direction.



6. Press the screws with the screwdriver and turn the screw clockwise. At this time, turn the position of the head of the screw until the [⊖] is horizontal.



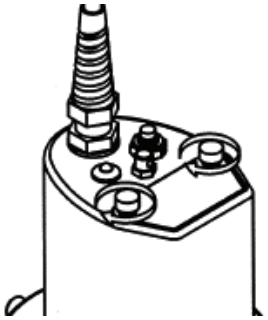
Notes for Mating Battery Cover

- Ensure that the silicone packing is fitted in the groove of the enclosure (reception side) where the battery cover is to be mated. If the silicone packing comes off the groove, attach it properly.
- Make sure that the silicon packing has not flaw, and that dust or other foreign matter is not attached.

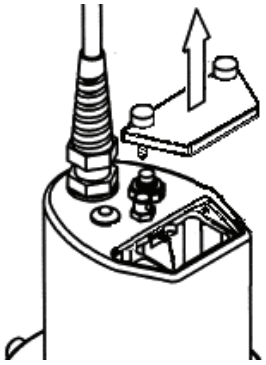
[2] Into Measuring Cell

* One 6F22 or 6LF22 battery is used.
The supplied batteries are just free samples. Note that the lifetime may be much shorter than expected.

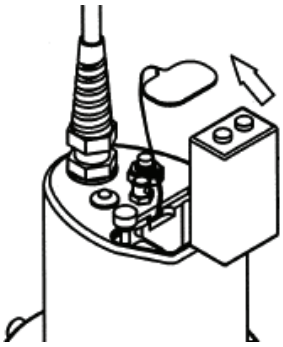
1. Loosen the screws of the battery cover.



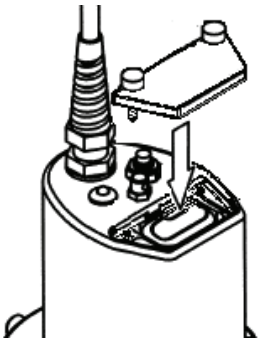
2. Pull the screws and remove the cover.



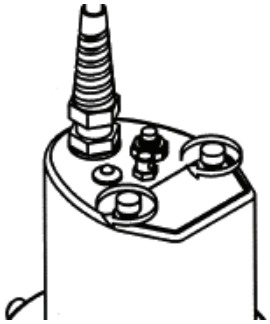
3. Draw the terminal from the battery chamber, and connect the terminal to the battery. Ensure that the +/- polarity is correct.



4. Place the battery connected with the terminal and put the cover.



5. Tighten the screws of the battery cover.



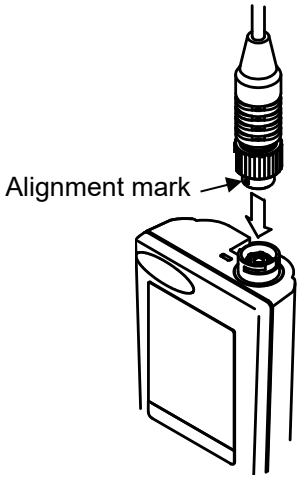
* After the installation of the battery, press the switch of the stirrer and make sure that the LED lights and that the stirrer bar spins.

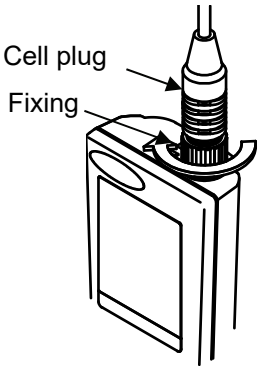
4. 4 Connecting Measuring Cell

1. Make sure that the power is off.

2. Mate the cell plug with the cell connector with the alignment mark pointing frontward.

3. Turning the fixing ring, fasten the cell plug. Be careful not to turn the cell plug.





Notes

- Before mating or removing the cell plug, make sure that the power is off.
- For mating or removing the cell plug, be sure to move the plug straight without turning or swinging the plug, or the plug and the cell connector may be damaged.

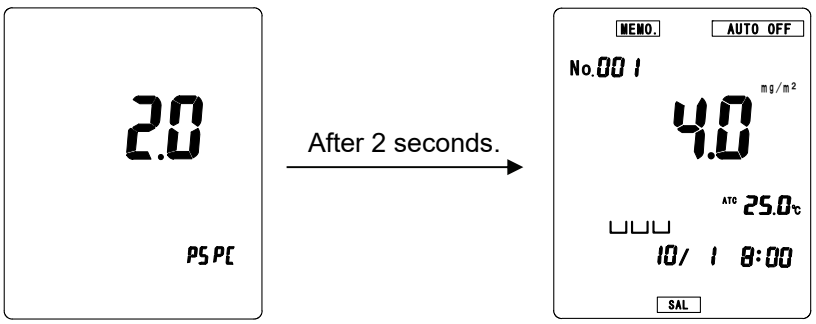
4. 5 Turning on Meter

Press POWER key, and the measurement screen (initial screen) will appear, after the software version number during 2 seconds is displayed.

When the water-soluble salts<PSPC> is chosen, a number will be displayed if a measurement cell is connected. This is the offset for corresponding to PSPC, and does not show abnormalities.

［Defaut Settings］

Measurement mode: Water soluble salts<PSPC>, Measurement time: 1 minute, Automatic power off: Enabled.



<Software Version Number Screen>　　<Measurement Screen>

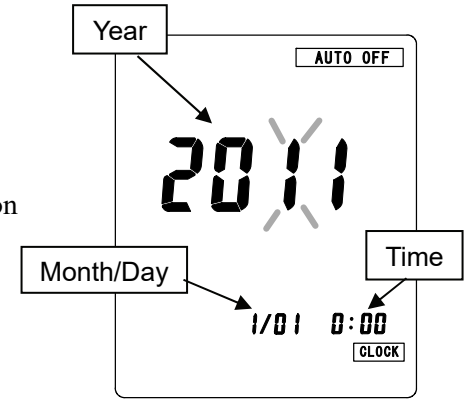
○ For occurrence of Fault

Warning	
	If you find an abnormal event, immediately turn off the power. If you find an abnormal operation, smell something burning or smoke, an abnormal event may occur inside. Immediately turn off the power and make contact with your local DKK·TOA sales office or your authorized distributor. Do not attempt to repair the instrument by yourself. It could result in danger.

4. 6 Setting Meter Clock

* Before first use or after replacing batteries, set the meter clock.

1. Turn on the power and display the measurement screen.
2. Press FUNCTION key.
3. Press ► key several times until flickering CLOCK indication appears.
4. Press SELECT/CLEAR key, and the clock setting screen will appear.



5. The flickering number can be changed with the ▲ and ▼ keys. The flickering figure can be changed by pressing ► key, then set in order of year, month, day, hour and minute.
6. Confirm the set value and press FUNCTION key twice to display the initial screen.

5. General Operation

5. 1 Before Measurement

[1] Meter

- Press POWER key of the meter to turn on the power, and confirm that the mater runs.
- After the meter starts running, make sure that BATT. is not indicated. If indicated, replace the batteries in the meter.
- Make sure that the output terminal cover and the battery cover have been attached properly.

[2] Measuring Cell

- Make sure that the electrodes of the cell are not contaminated. If dirty, wash the cell according to the instruction in 8. 2 Maintenance of Measuring Cell.
- Press the stirrer switch, and confirm that the stirrer spins.
- Make sure that the battery cover has been attached.

[3] Connecting Measuring Cell

- Connect the measuring cell to the meter, and confirm that MEMO. is indicated.

5.2 Settings for Measurment

* For the descriptions of function keys other than those described in this section, see 6. Available Functions.

[1] Selection of the salt concentration conversion method

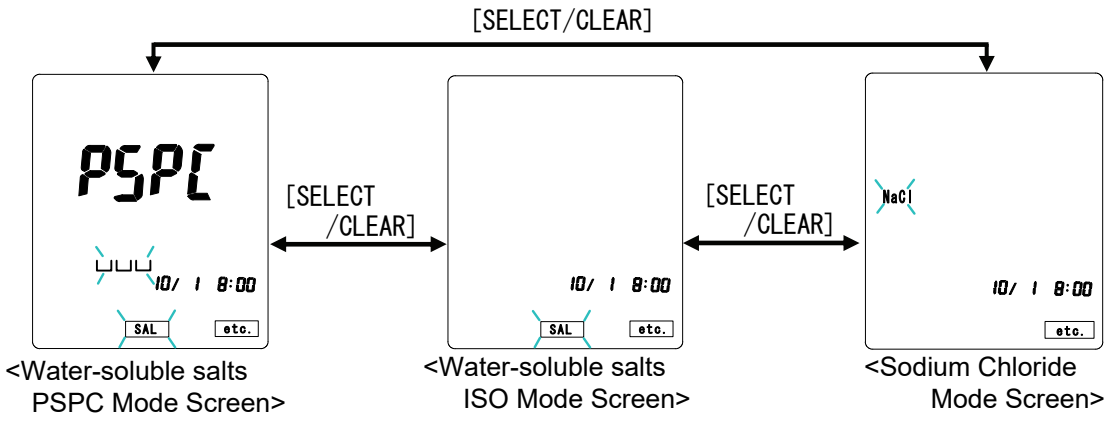
The meter measures electric conductivity, and can display it as salt concentration conversion measured value by the following three methods.

- The water-soluble salts <PSPC> concentration measured value based on IMO-PSPC.
- The water-soluble salts <ISO> concentration measured value based on ISO 8502-9.
- Salt concentration measured value converted into sodium chloride concentration.

The default is the water-soluble salts <PSPC> mode (indicating ⌊⌋⌊⌋⌊⌋ and SAL;)

Selection of the conversion method is operated as follows.

1. Press FUNCTION key with Measurement Screen displayed, and press ▼ or ► key to select etc. indication. Then, press SELECT/CLEAR key.
2. Press FUNCTION key twice with etc. indicated, and the mode selection screen will be displayed. Then, press SELECT/CLEAR key to change the flickering indication. (Water-soluble salts <PSPC> mode: ⌊⌋⌊⌋⌊⌋ and SAL; Water-soluble salts <ISO> mode: SAL; Sodium chloride mode: NaCl.)



3. Flicker a desired indication, and press FUNCTION key three times to display Measurement Screen. ⌴⌴⌴ and SAL is indicated in the water-soluble salts <PSPC> mode , SAL is indicated in the water-soluble salts <ISO> mode and NaCl is indicated in the sodium chloride mode, except for the case indicating electric conductivity.

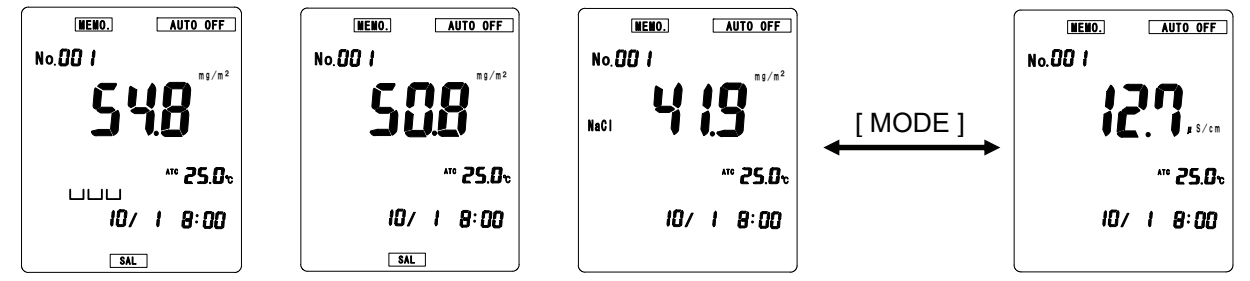
* About the water-soluble salts <PSPC> mode

The water-soluble salt <PSPC> mode is in order to perform measurement equivalent to the Bresle method. This measured value is compensated by adding 4mg/m^2 as a contamination factor of the Bresle-patch, and is displayed. Therefore, the measurement result in the water-soluble salts <PSPC> mode serves as a value always high 4mg/m^2 compared with the measured value in the water-soluble salts <ISO> mode. Moreover, even when electric conductivity value is 0μS/cm, in the water-soluble salts <PSPC> mode, the measured value of 4mg/m^2 is displayed.

[2] Change to Electric Conductivity

* For indicating electric conductivity instead of salt concentration, the following procedure is applied.

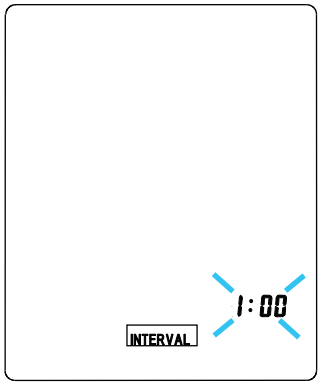
Press MODE key with Measurement Screen displayed, the display can be switched between the measured value display by the salt concentration conversion method set by [1] operation and the electric conductivity measured value display. Indication of stored data after measurement can also be switched in the same manner.



[3] Setting Measurement Time

* This procedure sets the time period for which salts in a sample are eluted into water covering the surface of the sample. The default setting of the time is 1 minute (1:00).

1. Press FUNCTION key and select INTERVAL with ► key. Then, press SELECT/CLEAR key to display Setting Screen.
2. Press SELECT/CLEAR key with Setting Screen displayed. The lower right figure is changed in this order: 1:00 (1 minute) → 3:00 (3 minutes) → 0:00 (continuous) every press of SELECT/CLEAR key. Display a desired measurement time.
3. Making sure that a desired measurement time is displayed, and press FUNCTION key twice to display Measurement Screen.



<Measurement time setting Screen>

* when the measurement time is set at 1:00 or 3:00, on pressing START/DATA IN key, the meter starts counting down from the measurement time, and the reading at the time the measurement time has elapsed is stored. When the measurement time is set at 0:00, the reading at the time when START/DATA IN key is pressed is stored.

[4] Checking on Settings

(1) Measurement Mode

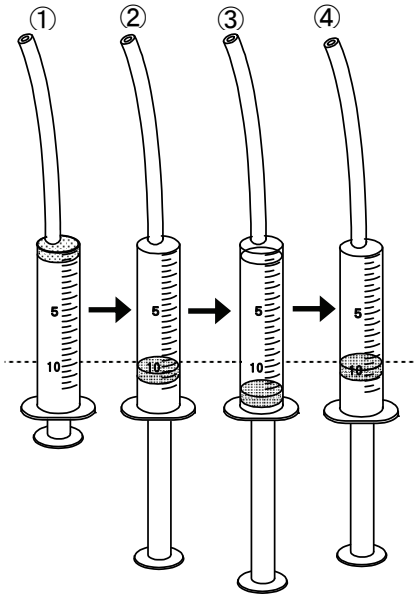
The current measurement mode can be known from the indications on the display. Check on indications, referring to the table below.

Measurement mode	Unit	Sign
Water-soluble salts <PSPC> mode	mg/m^2	⌴⌴⌴+ SAL
Water-soluble salts <ISO> mode	mg/m^2	SAL
Sodium chloride mode	mg/m^2	NaCl
Electric conductivity mode	μS/cm	None

(2) Measurement Time

While ► key is being pressed with Measurement Screen displayed, the clock indicates the currently effective measurement time with INTERVAL indicating.

5. 3 Sampling



<Syringe Operation>

1. Take 3 to 4 mL of pure water into the injection syringe, and reciprocally move the piston to wash the inside of the syringe. Repeat this twice or three times.
2. Take 10 to 11 mL of pure water into the syringe.
3. Draw 1 to 2 mL of air into the syringe with the tube end pointing upward so as to collect air together to the end of the syringe.
4. Slowly press the piston to discharge air, and make sure that the barrel of the syringe is completely filled with the pure water. Further press the piston until the end of the packing comes to the syringe graduation of 10 mL.
5. Before measurement, join the tube of the injection syringe to the inlet of the measuring cell.

5. 4 Zero Correction

* Zero correction cancels the electric conductivity of the pure water used for measurement from the reading of the sample. The zero correction is available in the electric conductivity mode.

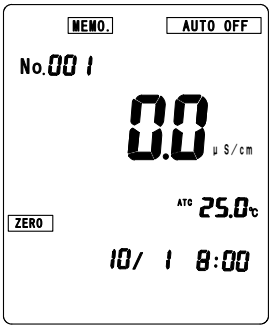
Notes

- If there is a difference in temperature between the place where the instrument has been stored and the measurement environment, allow the instrument and pure water to stand in the measurement environment for at least one hour.
- The electric conductivity measured for zero correction cannot be stored.

[1] Erasing Previous Zero Correction Value

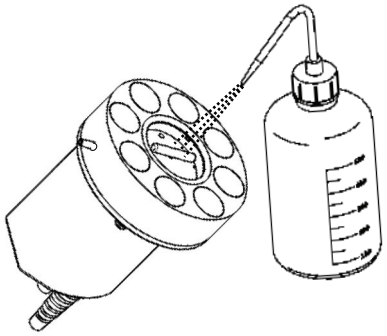
When the zero correction is enabled, ZERO is indicated on Measurement Screen. If a zero correction value has been set, delete the set value before the procedure for zero correction, as below.

1. Press ZERO key.
2. Press SELECT/CLEAR key while ZERO flickering.
3. Make sure that ZERO indication is extinguished.



<Measurement Screen after Zero Correction>

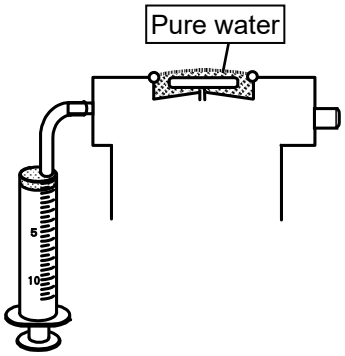
[2] Setting Zero Correction Value



1. Sufficiently rinse the inside of the measuring cell with pure water. If a wash bottle is not available, fill the cell with pure water and rinse the inside of the cell twice or three times.

2. Wipe away the remaining water in the cell with tissue paper or the like.
   Make sure that the air vent cocks are closed.

3. Make sure that the measurement is in the electric conductivity mode, indicating a unit μS/cm. If the measurement is in another mode, press MODE key to switch the mode.



4. Turn the electrodes of the cell up and fill the cell with the pure water used for measurement, according to the instructions below.

   - Take about 10 mL of pure water into the injection syringe, as described in Section 5. 3 and join the tube of the syringe to the inlet of the measuring cell. Then, slowly inject the pure water into the cell.
   - Join the tube of the empty injection syringe to the inlet, and inject the pure water into the cell until the stirrer is immersed in the pure water.

5. After making sure that the reading becomes stable, press ZERO key. ZERO starts flickering on the display.

6. On the completion of measuring zero correction value, the reading will become 0.0 with ZERO indicated.

Notes

If the electric conductivity of pure water is 5 μS/cm or more, an error arises. This can be caused by contamination of the water. Wash the insides of the cell and injection syringe. If the error still arises in spite of washing them, replace the pure water.

To erase the error indication, press SELECT/CLEAR key.

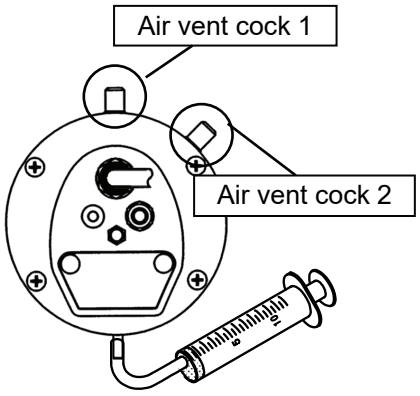
5. 5 Measuring Procedure

CAUTION	・ If there is a difference in temperature between the place where the instrument has been stored and the measurement environment, allow the instrument and pure water to stand in the measurement environment for at least one hour. ・ Before measurement, sufficiently wipe away the remaining water in the cell with tissue paper or the like. ・ After measurement, water will remain around the measured position. If measurement is performed in a place where water splash should be avoided, prepare a water-absorbing sheet in advance. ・ When you bring the measuring cell close to a steel material, the measuring cell sticks to it tightly. Be careful not to get your finger caught. ・ Before measurement, make sure that the covers are properly attached to the meter and measuring cell.

* The following will describe an exemplary procedure in which the measurement time is set at 1:00 (1 minute) or 3:00 (3 minutes). For taking pure water used for measurement into the syringe, see the above Section 5. 3.

[1] Removing Air from Measuring Cell

For injecting the pure water in the syringe into the measuring cell, the air in the cell should be removed. Three procedures are available according to the tilt angle of the surface to be measured.



(1) Using Air Vent Cock 1

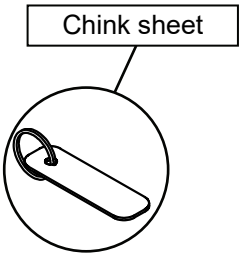
Air vent cock 1 is intended for measurement of surfaces having tilt angles between the floor (in a horizontal position) and the wall (in a vertical position).
The tilt angle is about 0° to 90° with respect to the horizontal plane.

(2) Using Air Vent Cock 2

Air vent cock 2 is intended for measurement of surfaces having tilt angles leaning from the vertical plane. The tile angle is about 0° to 60° with respect to the vertical plane.

(3) Using Chink Sheet

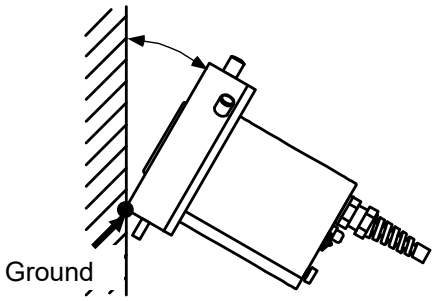
The chink sheet is intended for measurement of ceilings. Insert the portion 1 cm from the end of the chink sheet between the measurement surface and the measuring cell to form an air release gap.



The chink sheet has been joined with the strap before shipping.
The tile angle of the measurement surface is about 0° to 30° with respect to the ceiling.

[2] Setting Measuring Cell

For measurement, bring a point of the edge of the measuring cell into contact with the surface to be measured, and then set the cell as shown in the right figure, using the contact point as a fulcrum.
After measurement, take the cell off the surface in the same manner.



<Disposing Measuring Cell>

CAUTION	・ Be careful not to get your finger caught. ・ Do not slide or rotate the cell disposed on the measurement surface, or the O ring may be broken.

[3] Measuring Floors (horizontal planes) or Walls (Vertical planes)

* Air vent cock 1 is used.

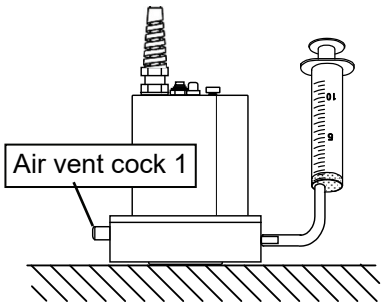
1. Rinse the inside of the cell with pure water, and wipe away the remaining water with tissue paper or a cotton swab.
   Join the tube of the injection syringe filled with 10 mL of pure water (see 5. 3) to the inlet of the measuring cell.

2. Fix the measuring cell on the surface to be measured. If the measurement surface is tilted, fix the cell on the surface in such a manner that air vent cock 1 is positioned as high as possible.

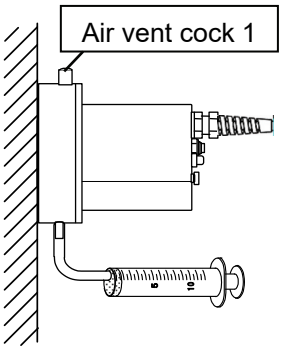
3. Loosen air vent cock 1 and inject the pure water into the cell.
   Then, fasten air vent cock 1 immediately.

4. Immediately press START/DATA IN key of the meter and subsequently the stirrer switch of the measuring cell, and the LED of the cell will light.
   The clock on the display changes into a countdown timer, and starts counting down from the measurement time.
   For canceling the measurement, press SELECT/CLEAR key.

5. A countdown buzzer sounds 5 seconds before termination of measurement. When the measurement is terminated, the buzzer stops, and a reading appears on

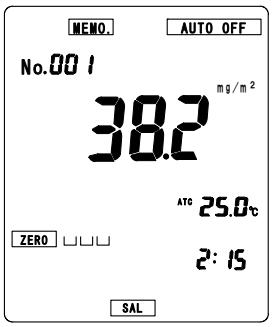


<On Horizontal Plane>



<On Vertical Plane>

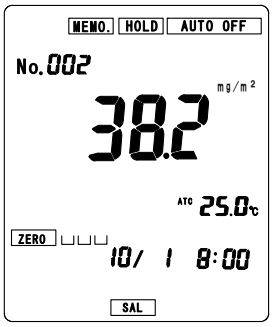
the display with HOLD· indicated. After the termination of the measurement, press the stirrer switch of the measuring cell to stop the stirrer, and the LED of the measuring cell will be extinguished.
When MODE key is pressed with the measured value indicated on the display, the indication is switched among salt concentrations (mg/m^2) and electric conductivity (μS/cm). START/DATAIN and ZERO keys are not available in a HOLD state.



<During Measurement>

* Measurements are automatically stored.

6. Take the measuring cell off the measurement surface.
Note that the measured solution may be ejected from the cell at this time. If the solution is ejected to a place where water splash should be avoided, wipe the solution with a water-absorbing sheet or the like.
For taking the measuring cell off, do not slide or rotate the cell, or the O ring may be broken.



<After Measurement>

7. Take 3 to 4 mL of pure water into the injection syringe, and reciprocally move the piston to wash the inside of the syringe. Repeat this twice or three times.
Rinse the inside of the measuring cell with pure water.

Notes

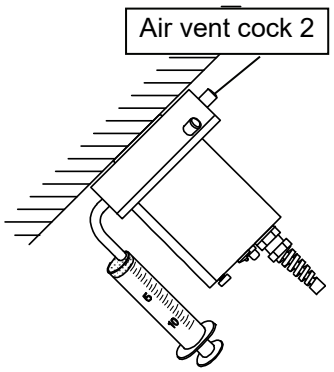
Air may remain in the cell after injecting pure water. This air may cause pure water to leak through the air vent cocks. In this instance, see Section 8. 2 [3].

[4] Measuring Leaning Planes

* Air vent cock 2 is used.

1. Rinse the inside of the cell with pure water, and wipe away the remaining water with tissue paper or a cotton swab.
Join the tube of the injection syringe filled with 10 mL of pure water (see 5. 3) to the inlet of the measuring cell.

2. Fix the measuring cell on the surface to be measured.
Ensure that the cell on the surface is fixed in such a manner that air vent cock 2 is positioned as high as



<On Leaning Plane>

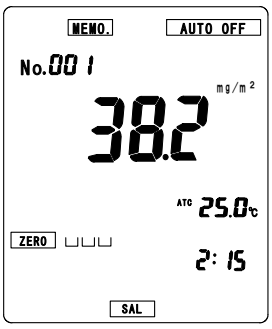
possible.

3. Loosen air vent cock 2 and inject the pure water into the cell. Then, fasten air vent cock 2 immediately.

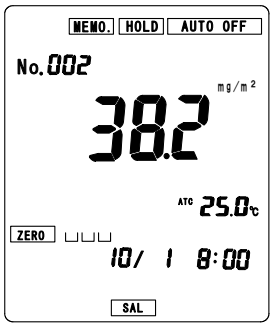
4. Immediately press START/DATA IN key of the meter, and turn on the stirrer of the measuring cell.
   Then, the clock on the display changes into a countdown timer, and stars counting down from the measurement time. For canceling the measurement, press SELECT/CLEAR key.

5. A countdown buzzer sounds 5 seconds before termination of measurement. When the measurement is terminated, the buzzer stops, and a reading appears on the display with HOLD· indicated. After the termination of the measurement, press the stirrer switch of the measuring cell to stop the stirrer, and the LED of the measuring cell will be extinguished.
   When MODE key is pressed with the measured value indicated on the display, the indication is switched among salt concentrations (mg/m^2) and electric conductivity (μS/cm). START/DATAIN and ZERO keys are not available in a Hold state.

   * Measurements are automatically stored.



<During Measurement>



<After Measurement>

6. Take the measuring cell off the measurement surface.
   Note that the measured solution may be ejected from the cell at this time. If the solution is ejected to a place where water splash should be avoided, wipe the solution with a water-absorbing sheet or the like.
   For taking the measuring cell off, do not slide or rotate the cell, or the O ring ma y be broken.

7. Take 3 to 4 mL of pure water into the injection syringe, and reciprocally move the piston to wash the inside of the syringe. Repeat this twice or three times.
   Rinse the inside of the measuring cell with pure water.

[5] Measuring Ceilings

* The chink sheet is used.

1. Rinse the inside of the cell with pure water, and wipe away the remaining water in the cell with tissue paper or a cotton swab.
   Join the tube of the injection syringe filled with 10 mL of pure water (see 5. 3) to the inlet of the measuring cell.

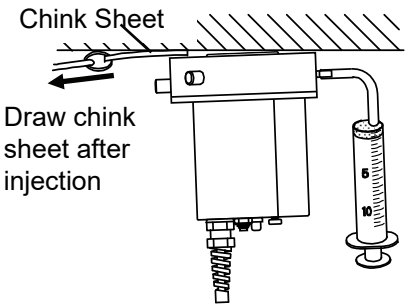
2. Fix the measuring cell on the measurement surface with the chink sheet (1 cm from the end) inserted between the measurement surface and the measuring cell. Ensure that the cell is fixed in such a manner that the position where the chink sheet is disposed is positioned as high as possible.

3. Inject the pure water in the syringe into the cell. As soon as the pure water is injected, draw the chink sheet and stick the measuring cell to the measurement surface.

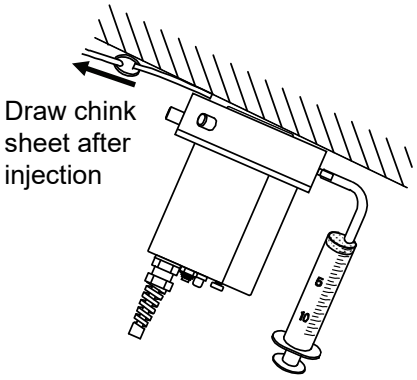
4. Immediately press START/DATA IN key of the meter, and turn on the stirrer of the measuring cell.
   Then, the clock on the display changes into a countdown timer and starts counting down from the measurement time. For canceling the measurement, press SELECT/CLEAR key.

5. A countdown buzzer sounds 5 seconds before termination of measurement. When the measurement is terminated, the buzzer stops, and a reading appears on the display with HOLD· indicated. After the termination of the measurement, press the stirrer switch of the measuring cell to stop the stirrer, and the LED of the measuring cell will be extinguished.
   When MODE key is pressed with the measured value indicated on the display, the indication is switched among salt concentrations (mg/m^2) and electric conductivity (μS/cm). START/DATAIN and ZERO keys are not available in a HOLD state.

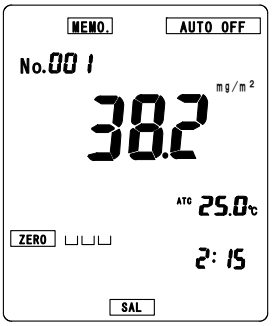
* Measurements are automatically stored.



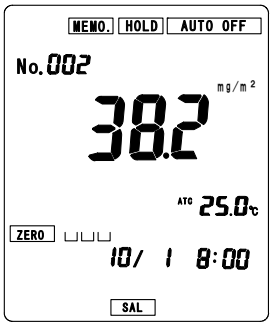
<On Ceiling>



<On Leaning Plane>



<During Measurement>



<After Measurement>

6. Take the measuring cell off the measurement surface. Note that the measured solution may be ejected from the cell at this time. If the solution is ejected to a place where water splash should be avoided, wipe the solution with a water-absorbing sheet or the like.
   For taking the measuring cell off, do not slide or rotate the cell, or the O ring may be broken.

7. Take 3 to 4 mL of pure water into the injection syringe, and reciprocally move the piston to wash the inside of the syringe. Repeat this twice or three times.
   Rinse the inside of the measuring cell with pure water.

5. 6 Continuous Operations

On terminating a measurement, the meter comes into a HOLD state. In the HOLD state, possible key operations are limited. Press SELECT/CLEAR key to cancel the hold state (erase HOLD· indication), and then conduct a desired operation.

(1) Keeping on measuring

Repeat the procedure described in 5. 5.

(2) Confirming Changes of Settings or Checking Stored Data

For confirming changes of settings or checking stored data, see Chapter 6 Available Functions, and for printing stored data or transmitting the data to a personal computer, see Chapter 7 Communication with Optional Devices.

5. 7 Completion of Measurement

1. Press POWER key of the meter to turn off the power.
   In some cases, Memory Check Screen may be displayed for several seconds with DATA indication flickering before power-off.

2. Check the measurement face of the cell for deposition or foreign matter on the fixing magnet or the O ring. If there is something unwanted, remove it.

3. Before storage, sufficiently rinse the insides of the cell and injection syringe with pure water and wipe away remaining water with tissue paper to dry.

* When automatic power-off function is enabled, the power of the meter is automatically turned off after 30 minutes from the last key press.
  The automatic power-off is not available in the measuring cell.
  For storage, see Section 10. 3.

6. Available Functions

* If HOLD is indicated, press SELECT/CLEAR key to cancel the HOLD state, and then enable a function.

6. 1 Data Memory Function

* The meter can store up to 300 sets of measurements. If the stored data number reaches 300, subsequent measurements overwrite existing data from No. 001.

[1] Setting Data Storage Number

* The data storage number of the subsequent measurement can be changed in the range of 1 to 300.

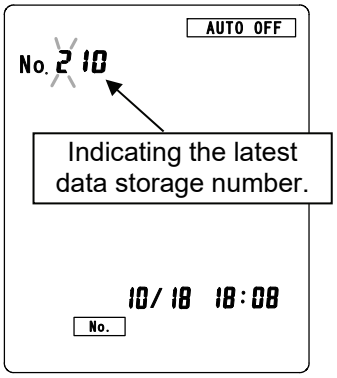
Notes

The data storage number to be set here refers to the first number from which measurement data will be stored.

Note that if data have already been stored in a designated data storage number, the data will be replaced with new data. If the number reaches 300, subsequent measurements overwrite existing data from No. 001.

1. Press FUNCTION key with Measurement Screen displayed and subsequently press ► key to flicker No. indication. Then, press SELECT/CLEAR key to display Data Storage Number Screen.

2. Change the number to a desired data storage number.
   By pressing ► key, the flickering place of the number is changed.
   The flickering place is variable.
   The figures can be changed with ▲ or ▼ key.



<Data Storage Number Screen>

3. Then, press FUNCTION key several times until Measurement Screen appears.

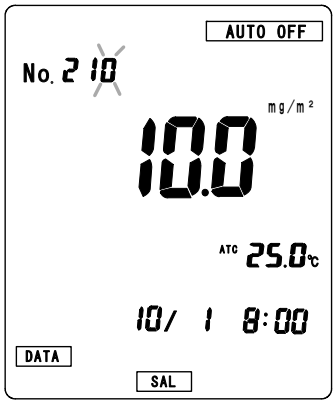
[2] Reading measurements

Notes

Stored data is displayed according to the effective measurement mode as follow:

When ⌴⌴⌴ and SAL is indicated: Water-soluble salts <PSPC> mode
When SAL is indicated: Water-soluble salts <ISO> mode
When NaCl is indicated: Sodium chloride mode

1. Press FUNCTION key with Measurement Screen displayed to flicker DATA, and then press SELECT/CLEAR key to display Stored Data Screen. The latest measurement is displayed with the latest data storage number. The data stored in a number include salt concentration, temperature and date and time.



<Stored Data Screen>

2. Input a desired data storage number.
By pressing ► key, the flickering place of the number is changed. The figures can be changed with ▲or ▼ key. Then, the measurement stored in the number will appear on the display.

* For check of a stored measurement on an electric conductivity basis, press MODE key with Stored Data Screen displayed, and the measurement is switched.

3. After checking the measurement, press FUNCTION key twice to display Measurement Screen.

* In order to output the data to a personal computer or a printer, see Section 7 Communication with Optional Devices.

6. 2 Setting Measurement Time

* The measurement time can be selected from three. The default is 1:00 (1 minute).

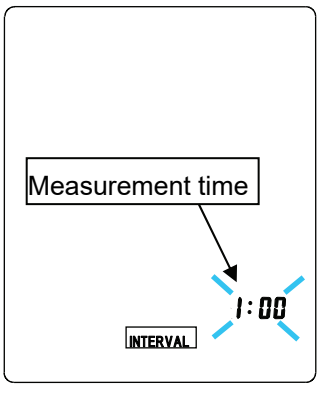
[1] Procedure for Setting Measurement Time

1. Press FUNCTION key and select INTERVAL with ► key. Then, press SELECT/CLEAR key to display Setting Screen.

2. Press SELECT/CLEAR key, and the time indication will change as below.

1:00 (1 minute) → 3:00 (3 minutes) → 0:00 (continuous) → 1:00 (1 minute)

3. Making sure that the desired measurement time is displayed, and press FUNCTION key twice to display Measurement Screen.



<Measurement Time Screen>

[2] Operation during Measurement

(1) When 1:00 (1 minute) or 3:00 (3 minutes) is selected

1. On starting measurement by pressing START/DATA IN key with Measurement Screen displayed, the clock on the display changes into a countdown timer and starts counting down the measurement time.
   After START/DATA IN key press, immediately start the stirrer of the measuring cell.
2. The countdown buzzer sounds 5 seconds before termination of measurement.
3. When the measurement time has elapsed, the buzzer stops, and the reading at that time is stored. After the termination of the measurement, stop the stirrer.
4. After the termination of the measurement, HOLD is indicated and Measurement Result Screen appears. For subsequently changing settings or repeating the measurement, press SELECT/CLEAR key to cancel the HOLD state.

   * For canceling measurement after starting the measurement, press SELECT/CLEAR key.

(2) When 0:00 is selected

On pressing START/DATA IN key with Measurement Screen displayed, a buzzer sounds and HOLD is indicated for 3 seconds. The reading at this time is stored as a measurement.

* Key operation is not available during indicating HOLD.

6. 3 Checking and Setting Cell Constant

* The current cell constant of the measuring cell can be checked and input.

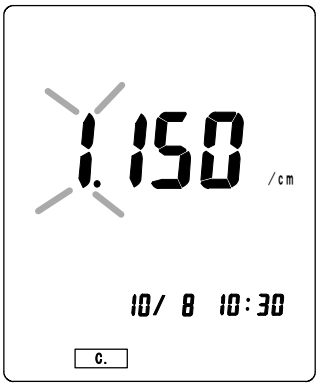
[1] Cell Constant

The cell constant of the measuring cell has been stored in the measuring cell in advance, and is automatically read to the meter as soon as the cell is connected to the meter. For the first use, make sure that there is no difference between the cell constant written on the cell and the cell constant read to the meter.

[2] Checking and Inputting Cell Constant

(1) Checking Cell Constant

1. Press FUNCTION key with Measurement Screen displayed and subsequently press ▼ or ► key to flicker C. indication. Then, press SELECT/CLEAR key to display Cell Constant Screen.
2. The reading indicated on the display is the current cell constant set in the meter.
3. After checking the cell constant, press FUNCTION key twice to display Measurement Screen.



<Cell Constant Screen>

(2) Manual input of Cell Constant

1. Press FUNCTION key with Measurement Screen displayed and subsequently press ▼or ► key to flicker C. indication. Then, press SELECT/CLEAR key to display Cell Constant Screen.
2. Change the reading indicated on the display to a desired value.

   By pressing ► key, the flickering place of the number is changed. The flickering place is variable. The figures can be changed with ▲ or ▼ key.
3. After changing the cell constant, press FUNCTION key twice to display Measurement Screen.

Notes

The manually input cell constant is not stored in the meter. When the meter is turned off, or when the measuring cell is removed and then joined to the meter again, the cell constant stored in the measuring cell overwrites the manually input cell constant.

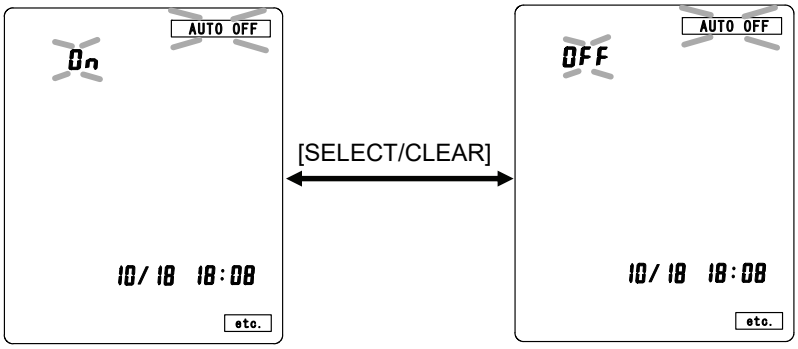
6. 4 Automatic Power-off Function

* When the automatic power-off function is enabled, the meter automatically turns off the power 30 minutes after the last key operation.
The automatic power-off function is enabled by default.

1. Press FUNCTION key with Measurement Screen displayed.
2. Flicker etc. indication with ▼ or ► key and press SELECT/CLEAR key.
3. Press FUNCTION key three times with etc. indicated, and flickering AUTO OFF appears.
4. The ON and OFF indications are switched by every SELECT/CLEAR key press.

5. Select either state, and press FUNCTION key five times to display Measurement Screen.

   * When the automatic power-off function is enabled, AUTO OFF flickers on Measurement Screen.

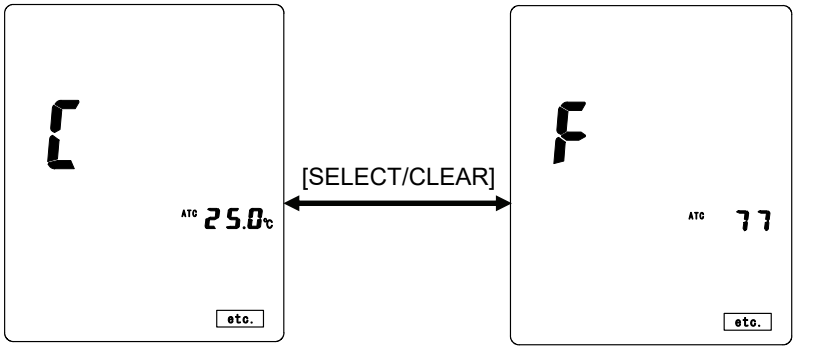


<Automatic power-off enabled> <Automatic power-off disabled>

6. 5 Switching Temperature Unit

* Celsius degree (°C) and Fahrenheit degree (° F) are available. The default is Celsius (°C).

1. Press FUNCTION key with Measurement Screen displayed.
2. Flicker etc. indication with ▼ or ► key and press SELECT/CLEAR key.
3. Then, press FUNCTION key three times, and C or F indication will appear.
4. The C (Celsius °C) or F (Fahrenheit ° F) indication is switched by every SELECT/CLEAR key press.
   At this time, the temperature reading is changed according to the temperature unit.
5. Select either unit, and press FUNCTION key twice to display Measurement Screen.



<Celsius degree indication> <Fahrenheit degree indication>

Notes

When the Fahrenheit degree is selected, the unit indication (° F) is not displayed.

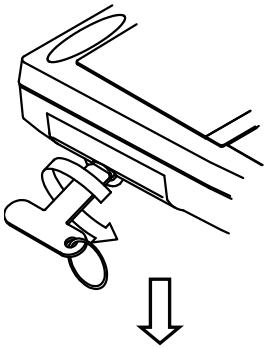
7. Communication with Optional Devices

7. 1 Opening/Closing Output Terminal Cover

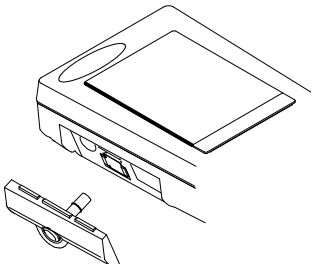
⚠ CAUTION	・ Before open or close the output terminal cover, turn off the power. ・ When the output terminal is open or an optional device is connected to the terminal, a risk of water penetration is high. Sufficiently take care not to be splashed with water. ・ Although indications AC ADAPTOR and ANALOG are engraved on the output terminal cover, these options are not available for the product SSM-21P.

(1) Open the output terminal cover

1. Loosen the screw of the output terminal cover of the meter with the supplied screwdriver.

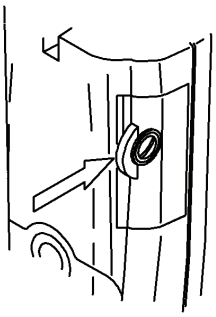


2. Pull the cover to remove.



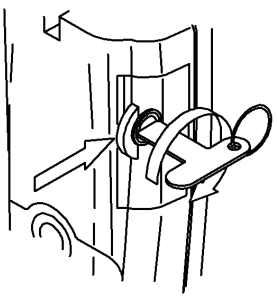
(2) Close the output terminal cover

1. Make sure that there is no foreign matter on or crack in the silicone packing attacked to the inner side of the cover, and that the silicone packing is properly fitted in the groove.



2. Put the cover to the meter body with press in the arrow direction.

3. Push the screw into the meter body with the supplied screwdriver with the output terminal cover pressed in the arrow direction.



Notes for attaching the Output Terminal Cover

- Make sure that silicone packing is properly fitted in the groove of the output terminal cover. If the silicone packing comes off the groove, attach it properly.
- Ensure that the silicon packing has not flaw, and that dust or other foreign matter is not deposited.

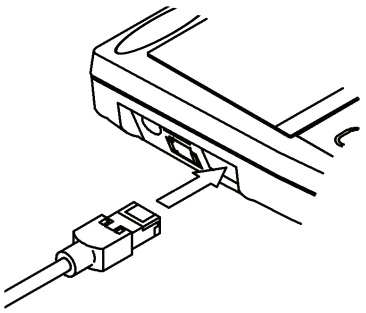
7. 2 Printing with External Printer

* The data stored in the meter can be printed on plain paper by communication with an external printer.

CAUTION	・ Only printers designated by DKK·TOA can be used. ・ Before cable connection with the meter, make sure that the power to the meter is off. ・ Do not handle the cable to the output terminal with wet hands. ・ For measurement, remove the cable from the output terminal.

[1] Connection to External Printer

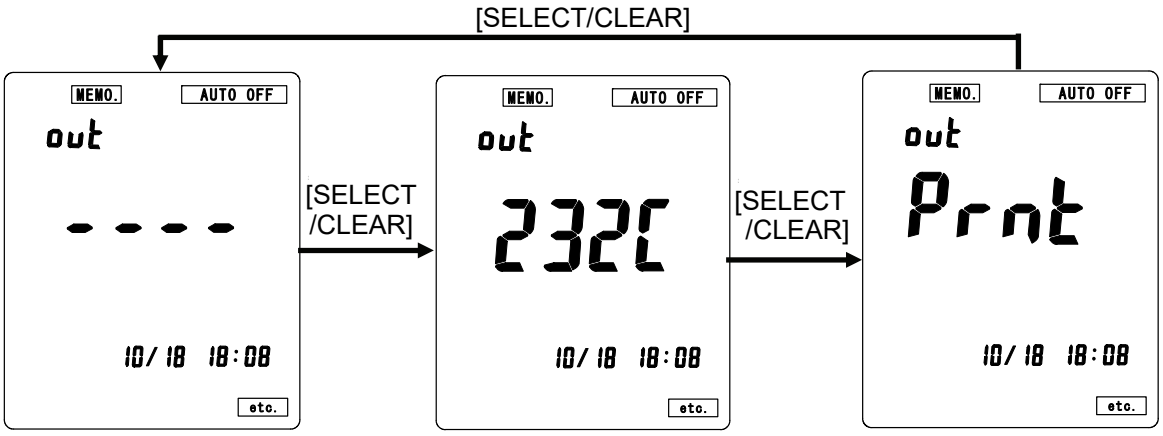
1. Make sure that the power to the meter is off.
2. Open the cover at the side of the meter body, and then connect the cable of the printer to the meter.
3. Connect the other end of the cable to the printer. For the connection to the printer, see the instruction manual of the printer.
4. Turn on the meter and the printer.



[2] Enabling Output to Printer

* In this setting, which the external output terminal is connected to is designated. In the default, no signal is output and "----" is indicated on the display.

1. Press FUNCTION key with Measurement Screen displayed.
2. Flicker etc indication with ▲, ▼, ► key, and press SELECT／CLEAR key.
3. Press FUNCTION key once with etc indicated, and a screen indicating "out" will appear.
4. Press SELECT／CLEAR key, and "Print" (printer output) is indicated on the display.
5. Press FUNCTION key four times to display Measurement Screen.



<No output> <Output through RS-232C> <Output to printer>

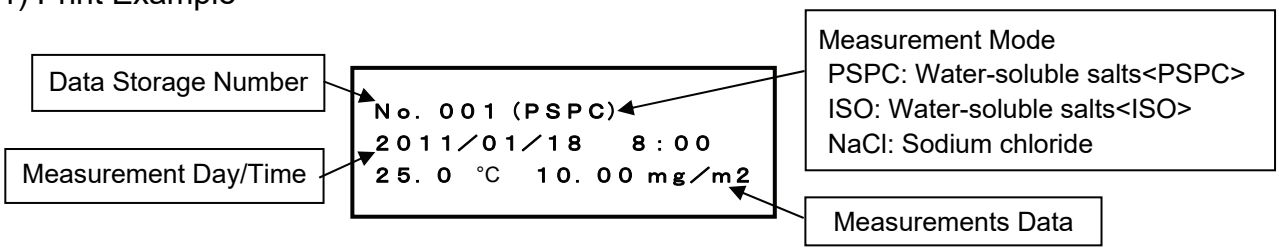
[3] Printing Stored Data

Notes

- The stored data is printed and indicated with a unit according to the effective measurement mode. The effective measurement mode can be known from indications on Measurement Screen.

  ␣␣␣ and SAL indication: Water-soluble salts <PSPC> mode
  SAL indication : Water-soluble salts <ISO> mode
  NaCl indication : Sodium chloride mode

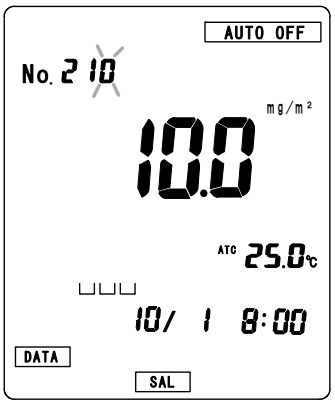
(1) Print Example



(2) Printing Specific Data

* A specific measurement indicated on the display can be solely printed.

1. Press FUNCTION key with Measurement Screen displayed.
2. DATA starts flickering.
3. Press SELECT／CLEAR key to display Stored Data Screen. The latest data appears including salt concentration, temperature and date and time.
4. Input a desired data storage number with ► , ▲ and ▼ keys.



<Stored Data Screen>

By pressing ► key, the flickering place of the number is changed, and the figures can be changed with ▲ or ▼ key.

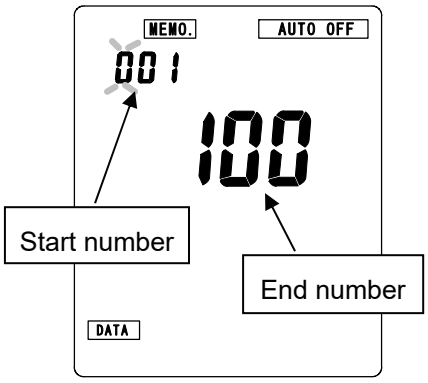
* For displaying a stored electric conductivity measurement, press MODE key to change the measurement is switched.

5. Press START/DATA IN key, and the data displayed on the display will be printed.
6. After completion of printing, press FUNCTION key twice to display Measurement Screen.

(3) Sequential data printing

* Data stored in consecutive data storage numbers can be printed one after another.

1. Display Stored Data Screen through Steps 1 to 3 of above (2).
2. Press SELECT/CLEAR key to display Sequential Data Print Screen.
3. Select a desired data storage number at which printing starts and another at which printing stops, using ▲, ▼ and ► keys. By pressing ► key, the flickering place of the number is changed, and the figures can be changed with ▲ or ▼ key.



<Sequential Data Print Screen>

* Select a start number first, and subsequently select an end number.

4. Press START/DATA IN key, and data stored in the designated data storage numbers will be printed.
5. After completion of printing, press FUNCTION key twice to display Measurement Screen.

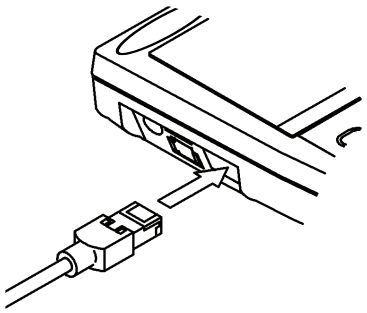
7. 3 Communication with Personal Computer (PC)

CAUTION	・ A connection PC should use that AC power supply part is equivalent to double insulation, or the thing which has the insulated rating beyond it. When unknown, please check to a PC maker. ・ Be sure to use a PC connection cable designated by DKK·TOA. ・ Do not handle the PC connection cable to the output terminal with wet hands. ・ Before connection of the PC cable with the meter, make sure that the power to the meter is off. ・ For measurement, make sure that a cable is not connected to the output terminal. ・ In USB connection, please prepare a USB RS-232C”9”pin Conversion Adapter other than an exclusive connecting cable.

[1] Connection to PC

Before connection, make sure that the power to the meter is off.

1. Join the terminal of the optional PC connection cable with the RS-232C port of the output terminals.
2. Join the PC connecter (D-sub 9 pin) of the PC connection cable to a PC.
3. Turn on the meter.



[2] Enabling Output through RS-232C

* Referring to Section 7. 2 [2] Enabling output to the printer, enable the output through RS-232C. If a procedure for printing described in 7. 2 is performed during setting RS-232C communication, stored date can be output. The stored data cannot be output by key operation of the meter.

[3] Specifications of Interface

1. Data transmission: asynchronous half-duplex
2. Signaling speed: 9600 (bps)
3. Character configuration
   - Start bit: 1 bit
   - Data length: 8 bits
   - Parity check: No
   - Stop bit: 2

4. Pin assignments

The PC connector of the cable is 9 pin D-sub.

Pin number	Signal notation	Signal type	direction*
1	Not assigned	--	--
2	SD(TXD)	Transmit Data	in
3	RD(RXD)	Received Data	out
4	DR(DSR)	Data Set Ready	out
5	GND	Protective Ground	
6	ER(DTR)	Data Terminal Ready	in
7	CS(CTS)	Clear to Send	out
8	RS(RTS)	Request to Send	in
9	Not assigned	--	--

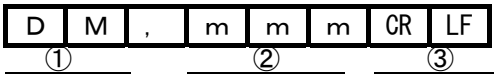
* direction from/ to PC

Note: Ensure CS/RS control.

[4] Data Configuration

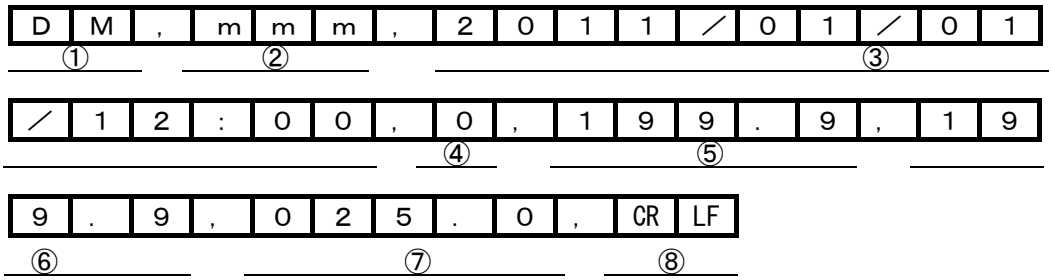
(1) Stored data request (PC → SSM-21P)

Requests stored data with a designated data storage number.



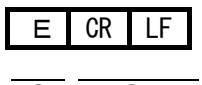
① Request code ② Data storage number（No. 001 to 300） ③ Completion code

■ Response: when a data request command was received (SSM-21P → PC)



① Identification code
② Data Number （001 to 300）
③ Year/ Month/Day, Time
④ Measurement Mode 0: Water-soluble salts<PSPC> mode
1: Water-soluble salts<ISO> mode
2: Sodium chloride mode
⑤ Concentration (The calculated value by the measurement mode shown in ④.)
⑥ Electric conductivity
⑦ Temperature (Celsius)
⑧ Completion code

(2) ERROR/OK code transmission (SSM-21 → PC)



① Identification code E: Error O: O. K.
② Completion code

[5] Data Acquisition Software

Software (Data Acquisition software G-LOG2) is available for importing measurement data in a CSV form into a PC.

Tables and graphs can be prepared from the data collected in the PC by a commercially available spreadsheet program.

For more information, please contact us.

8. Maintenance

CAUTION	・ Do not use organic solvents such as thinner to remove dirt or soil, or the enclosure of the instrument may be discolored or deformed. ・ Do not immerse the instrument in water or the like, or the instrument may be broken.

8. 1 Maintenance of Meter

For removing dirt, wipe the surface of the instrument with dry soft cloth or tissue paper. If the dirt is tough, prepare gauze impregnated with diluted neutral detergent and wrung tightly, and wipe the dirt with the gauze.

8. 2 Maintenance of Measuring Cell

[1] Normal maintenance

・ The body of the cell is cleaned in the same manner as the meter.

・ If foreign matter is deposited on the fixing magnet or the O ring, remove it.

・ Check for a crack in the O ring.

・ Sufficiently wash the insides of the measuring cell and the injection syringe, and wipe away the remaining water from the cell with tissue paper or the like.

[2] Maintenance for Dirty Cell

Dirt or foreign matter in the cell may increase measurement error, make it difficult to inject water, and causes other problems. When you fine something dirty in the cell, wash the cell according to the following procedure.

1. Wash the inside of the cell, including the electrodes and other metal parts, with sponge or the like impregnated with neutral detergent.
2. Rinse out the detergent with running water and further rinse the inside with pure water.
3. Wipe the remaining water away with tissue paper or the like.

[3] When a Required Amount of Water cannot be Injected

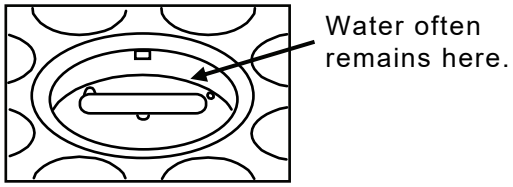
When a floor or a horizontal plane is measured, injected pure water may be leaked through the air vent valves due to air remaining in the cell, and a required amount of water may not be introduced into the cell. In such a case, refer to the following instructions.

(1) Cleaning the inside of the cell

1. Wipe the inner wall of the cell with soft cloth or tissue paper impregnated with ethanol. If ethanol is not available, use neutral detergent in the same manner instead. After wiping the inner wall of the cell, however, sufficiently rinse out the detergent with running water.
2. Sufficiently rinse the inner wall of the cell with pure water, and wipe the remaining water away with tissue paper.

(2) Notes for measurement

- When the surface to be measured is tilted even at a small angle, fix the cell on the surface in such a manner that air vent valve is positioned as high as possible.
- Before measurement, wipe away the water remaining in the cell with tissue paper or a cotton swab. Particularly carefully wipe the corner that can easily trap water.



8. 3 Replacing Batteries

* For disposing of waste batteries, please follow lows and regulations of your local government.

[1] Meter

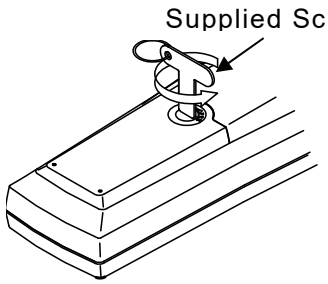
* Two LR6/AA batteries are used. Spare batteries are commercially available.

● If BATT. indication appears on Measurement Screen, replace the batteries with new ones.

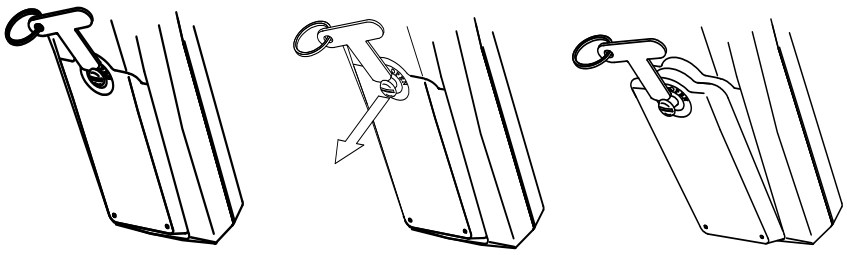
Notes

Replace batteries as fast as possible within 1 minute, or data and time settings may be erased. Data stored in the memory is not erased.

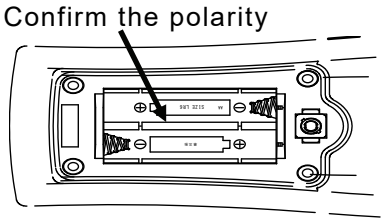
1. Turn the screws of the battery cover in the arrow direction to loosen them with the supplied screwdriver.



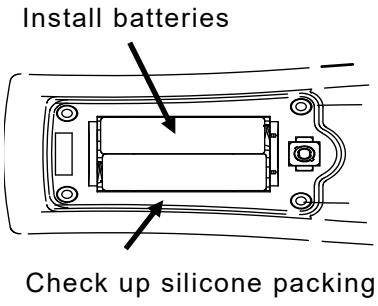
2. Turn the meter body upside down so that the battery cover faces down, and the screw head will protrude. Pull the screw with fingers or with the supplied screwdriver as shown in the figure below, and remove the cover.



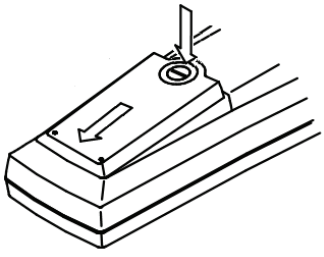
3. Confirm the orientation of the batteries.



4. Install two LR6 (AA) batteries in the battery chamber.
Alkaline batteries can run for about 50 hours.
The lifetime of the battery depends on the product and the environment.

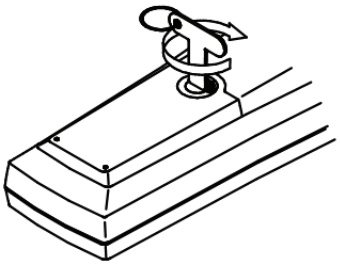


5. Ensure that the silicon packing has not flaw, that dust or other foreign matter is not attached, and that silicone packing is properly fitted in the groove of the meter body.



6. Catch the lugs of the battery cover with the body case, and press the cover down, pushing it in the arrow direction.

Press the screws with the screwdriver and turn the screw clockwise. At this time, turn the position of the head of the screw until the [⊖] is horizontal.



Notes for mating Battery Cover

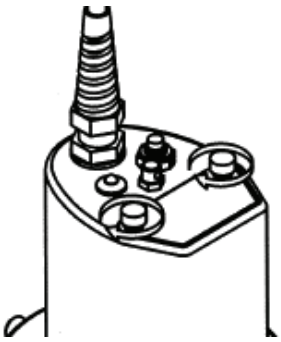
· Ensure that the silicone packing is fitted in the groove of the enclosure (reception side) where the battery cover is to be mated. If the silicone packing comes off the groove, attach it properly.
· Make sure that the silicone packing has not flaw, and that dust or other foreign matter is not attached.

[2] Measuring Cell

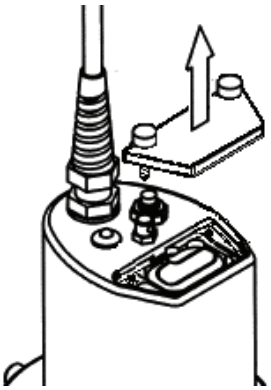
* One 6F22 or 6LF22 battery is used. Spare batteries are commercially available.

- When the LED flickers or extinguishes, or when the rotational speed decreases, replace the battery with new one.

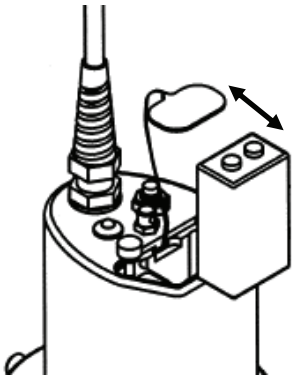
1. Loosen the screws of the battery cover.



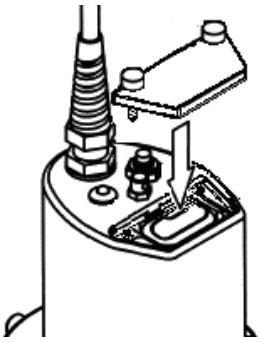
2. Pull the screws and remove the cover.



3. Draw the terminal from the battery chamber, and connect the terminal to the battery. Ensure that the +/- polarity is correct.

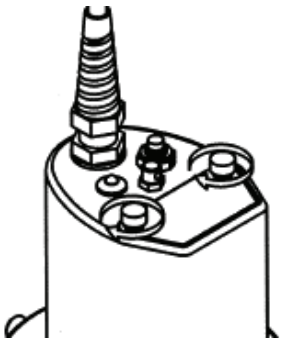


4. Load the battery connected to the terminal in the battery chamber and mate the cover.



5. Tighten the screws of the battery cover.

* After the installation of the battery, press the switch of the stirrer and make sure that the LED lights and that the stirrer spins.



8. 4 Checking Measuring Cell

CAUTION	・ For handling chemicals, wear appropriate protective equipment, such as protective glasses or protective gloves, if necessary.

Notes

- Conductivity cell check solution 0.01 mol/kg is intended to check whether the measuring cell responds properly.
- For use as authentic equipment, please receive periodic maintenance and calibration by DKK-TOA, preferably every one years. Make contact with your local DKK-TOA sales office or your authorized distributor for request for maintenance.

* Conductivity cell check solution 0.01 mol/kg (143A144) is used for measuring cell check.
The check procedure is performed at a measuring temperature of 25 ± 5°C.
To store the measurement of Check solution 0.01 mol/kg, change the measurement time setting to 0:00 (continuous).

[1] Preparation

- Allow the meter, the measuring cell, Check solution 0.01 mol/kg (143A144) and pure water to stand in a room where measurement will be performed for at least one hour so that their temperatures become the same as the measurement environment.
- Unopened solution should be used. Do not use any Check solution 0.01 mol/kg (143A144) that has been opened and stored.
- Start the meter and bring it into the electric conductivity mode.

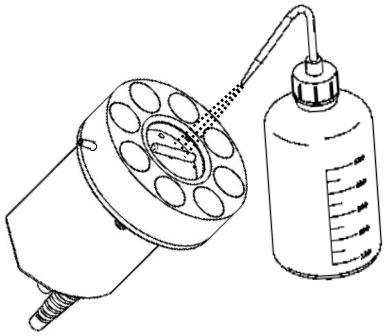
[2] Procedure for Checking Measuring Cell

(1) Deleting previously Set Zero Correction Value

When a zero correction value has been set, ZERO is indicated on the measurement screen. If yes, delete it in the following procedure.

1. Make sure that the measurement is in the electric conductivity mode, indicating a unit μS/cm. If the measurement is in another mode, press MODE key to switch the mode.)
2. Press ZERO key.
3. Press SELECT/CLEAR key while ZERO indicated.
4. Make sure that ZERO indication is extinguished.

(2) Measuring Check Solution 0.01 mol/kg



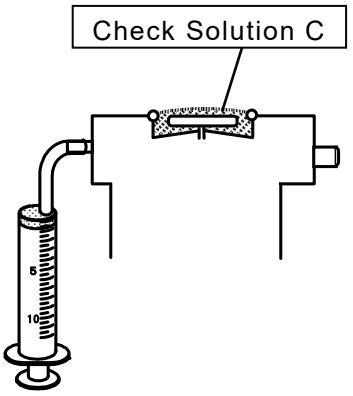
1. Sufficiently rinse the inside of the measuring cell with pure water.
2. Pour off the washing water from the cell.
   Close the air vent valves.
3. Take pure water into an injection syringe and rinse its inside.
4. Turn the electrodes of the cell up and fill the cell with Check solution 0.01 mol/kg , and thus condition the cell at least three times.
   During conditioning, check the temperature reading and ensures that the solution temperature is 25 ± 5°C.

5. Take 4 to 5 mL of Check solution 0.01 mol/kg into the injection syringe, and reciprocally move the piston to wash the inside of the syringe. The conditioning is repeated at least three times.）

6. Take 10 mL of Check solution 0.01 mol/kg into the syringe in the same manner as the procedure for taking pure water.

7. Join the injection syringe containing Check solution 0.01 mol/kg to the conditioned measuring cell, and slowly introduce the Check solution into the cell.

8. Read the indication on the display after the reading becomes stable.
   If the measurement time has been set to 0:00 (continuous), the reading can be stored by DATA IN key press.



[3] Judgment of Measurement

(1) Criteria

The reference of the electric conductivity of Solution 0.01 mol/kg at 25 ± 5°C is:

Reference: 1.408 mS/cm (25.0°C）
Tolerance: Reference ± 5% (1.339 to 1.480 mS/cm)

(2) If the measurement is outside of the tolerance:

- Wash the inside of the measuring cell with reference to 8. 2 [2].
- If the problem is not eliminated by cleaning or washing, it is supposed that the cell should be readjusted. Make contact with your local DKK-TOA sales office or your authorized distributor.

9. When Problems Occur

9. 1 Safety Precautions for Abnormality

Should an abnormal event occur, follow the instructions below.

Warning	
	If an abnormal event occurs in use, immediately turn off the power. If you find an abnormal operation or smell something burning, an abnormal event may occur inside. Immediately turn off the power and make contact with your local DKK·TOA sales office or your authorized distributor. Do not attempt to repair the instrument by yourself. It could result in danger.

9. 2 Error Indications

If an incorrect operation or a problem occurs, the meter indicates that an error has arisen.
In such a case, ERROR is indicated on the display, and optionally an error number is indicated depending on the type of error.

* In order to erase the error indication and to display Measurement Screen

Press SELECT/CLEAR key with ERROR indicated.

Error Indications

Indication	Problem	Cause	Remedy
ERROR	Zero correction failure	Contamination of measuring cell	Clean and wash the measuring cell
		Dirt of equipment	Clean and wash the equipment.
		Pure water has a high electric conductivity.	Replace pure water
E.10 ERROR	Incorrect electrode	Incorrect electrode, such as a pH electrode, is connected.	Replace the incorrect electrode with a proper cell.

Notes

The Surface Salinity Meter SSM-21P is used in combination with a specific measuring cell ELC-006. If another type for measuring electric conductivity is connected, measurement cannot be made, but no error indication appears.

9. 3 For Other Problems

The following table shows problems other than those resulting in error indications, and their remedies. If the problem is not solved in spite of the following remedies, if other problems occur, or if repair is required, make contact with your local DKK·TOA sales office or your authorized distributor, telling the mode and type of the product, and its serial number indicated on the back side of the product.

phenomenon	Cause	Remedy
Nothing appears even though the power is on.	Batteries are not installed, or the batteries have run out.	Replace the batteries.
The instrument does not operate in spite of key press.	The meter is in a hold state. (HOLD is indicated on the display.)	Cancel the hold state.
The reading does not change.	The meter is in a hold state. Faulty connection between the meter and the measuring cell. The cell is out of order.	Cancel the hold state. Establish proper connection between the meter and the cell. Replace the measuring cell.
Unstable reading Slow response	Air is trapped around the electrodes. The cell is contaminated. The cell is broken. The mount of pure water injected is small. Injected pure water is leaking.	Spin the stirring bar. Wash the measuring cell. Replace the measuring cell. Inject 10 mL of pure water. Make sure that the surface to be measured is not deformed, and that foreign matter is not caught between the measurement surface and the cell.
Reading flickers.	The measurement is outside the measurement range.	Check the measurement surface.

	Faulty connection between the meter and the measuring cell.	Establish proper connection.
	The cell is broken.	Repair or replace the measuring cell.
	The electrodes of the cell are not immersed in water. ・ The amount of water is insufficient. ・ Water leaks from the cell.	Inject 10 mL of pure water. Make sure that the surface to be measured is not deformed, that foreign matter is not caught between the measurement surface and the cell, and that the O ring is not cracked.
Temperature reading flickers.	Temperature is too high.	The meter cannot measure temperatures outside the measurement range.
	Faulty connection between the meter and the measuring cell.	Establish proper connection between the meter and the cell.
	The temperature sensor is broken.	Replace the measuring cell.

9. 4 System Reset

If the instrument does not operate at all, or if an abnormal event arises, it may be restored by system reset. For system reset, turn off the power once.

Notes

If system reset is performed, stored data is held in the memory, but clock settings and the zero correction value are erased to return to defaults.

1. Remove the battery cover of the meter, and take off the batteries.
2. Press POWER key without batteries.
3. Ensure that the polarities of the batteries are correct, and mate the battery cover to the meter body.
4. Press POWER key with DATA IN key press to start the operation of the meter.

10. Transfer, Storage and Disposal

10. 1 Transfer Precautions

For transferring or transporting the instrument, keep the following precautions and writings in mind.

- For packing the instrument for transport, use the box in which the instrument has been delivered.
- The damage or failure during transfer in use of other packing materials is not subject to the warranty.
- Be sure to take off batteries before transfer.

10. 2 Transfer

Package the instrument with packaging material in the box in which the instrument has been delivered. Be careful not to drop or roll over the box, or do not stack anything heavy on the box, or the instrument may be broken.

10. 3 Storage Precautions

CAUTION	
	Before storage, take off batteries. Leak of the batteries may cause corrosion of the interior of the instrument.
	Do not store in a place where water or chemicals may splash over the instr ument. The enclosure of the instrument may be discolored or deformed, or short-cir cuit may occur to result in operational failure.

Miscellaneous

- Keep the instrument in an environment at a temperature of 0 to 40°C and a humidity of 0% to 85%.
- Avoid condensation.
- Keep the instrument in environment where corrosive gases are not produced.
- Avoid vibration.
- Avoid direct sunlight.
- Avoid dust and suspended matter in the air.
- Do not leave the instrument in an imbalanced or a dangerous place, and take care not to give a strong impact or drop the instrument.

- Avoid storing the instrument by a heater, such as stove, or in an extremely cold place.
- Avoid direct blowing on the instrument from the air conditioner.

10. 4 Disposal Precautions

For disposing of the instrument or used batteries, be sure to comply with all laws and regulations of your local government.
For more information, contact your local government.

WARNING	
 	Do not throw the instrument and batteries into fire or burn it. Explosion or burst may occur.

CAUTION	
	In Europe, the instrument and batteries cannot be disposed of as waste. When the instrument is used in Europe, please recycle or reuse the product in co mpliance with relevant regulations and laws of your country and local government.

* Additional Information: Material
● Meter ・Enclosure: ABS
● Measuring Cell ・Body: ABS, PU ・Cable Sheathe: PVC Cell plug: PPS, PVC, PA ・Battery cover: SUS304

11. Accessories and Options

For purchase of accessories, spare parts or options, please order from the distributer from which you bought the product. At this time, inform the distributer of the product name, model or code number, and the quantity or number you need.

○Standard Accessories

Product name	Code	Quantity	Remark
Neck Strap	0TC00001	1	For meter
Exclusive Screwdriver	0OZ00001	1	For open/close battery cover and option cover
Chink sheet	7136300K	1	Air Release Sheet for Ceiling Face Measuremen.

* LR6 (AA) batteries for the meter and 6F22 or 6LF22 battery for the measuring cell are commercially available.

○Convenient Options

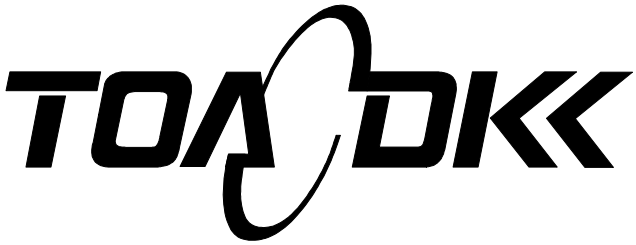
Product name	Code/Model	Quantity	Remark
Soft case	6787140K	1	For meter
Carrying Case	0DA00001	1	For storage of meter, measuring cell and work accessaries
Measurement Kit	7148480K	1	For field measurement, including 500 mL beaker, 500 mL wash bottle and 500 mL pure water tank
Injection Syringe Set	7148470K	1	5/package
Data Acquisition Software	G-LOG2	1	For importing data to PC
RS-232C Cable (2m)	7156370K	1	For Meter-PC connection (PC connector: 9 pin D-sub)
Check Solution 0.01 mol/kg for Conductivity Cell	143A144	1	100mL x 4 Bottles
External Printer*	7158410K	1	100V AC Including cable
Printer Chart Paper	P00019	1	For EPS-G, non-thermal paper, 20 rolls/package
Ink Ribbon	0RD00001	1	For EPS-G

*:If another voltage is required,make contact with your local DKK-TOA sales office or your telling the power supply voltage of the area to be used.

Revision History

Instruction Manual No. SSM-AA22500E	6/25/2009(RS1)	First edition (English Version) (RS1 Sasakura)
SSM-AA22501E	3/18/2011(RS1)	Revision by having added PSPC mode. Revised portion : Introduction/2.[1] Meter/3.[2] Display/ 4.5 Turning on Meter/5.2 Settings for Measurement/ 6.1[2] Reading Measurements/7.2[3] Printing Stored Data/ 7.3[4] Data Configuration (RS2 Sasakura)
SSM-AA22502E	3/21/2012(RS1)	Revised portion : Introduction/1. Parts in Package/ 5.2[1] Selection of the salt concentration conversion method (RS1 Sasakura)
SSM-AA22503E	1/30/2020(RSL)	Revised according to Japanese instruction manual Ver.AA22504 (“Conductivity cell check solution C (0BI00001)” changed to “Conductivity cell check solution 0.01mol/kg (143A144)” etc.) (RSL Okano)
SSM-AA22504E	2/13/2025(RSL)	Revised portion : Front cover/Back cover (RSL Arakawa)

Print size: B5 (Original size: A4), Perfect bind. RSL



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