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DO Measuring Device / MA-300

Operation Manual

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Thank you for purchasing the IIJIMA DO Measuring Device, model MA-300.
This device can measure the dissolved oxygen (DO) in fluid using the optional residual oxygen meter PACK MASTER, model RO-105S and a stirrer.

This manual describes how to operate the DO Measuring Device and the precautions that must be observed to ensure proper and safe use. Always read this manual and fully understand the operation before starting use.
Keep this manual near the device for quick reference at any time.

IIJIMA Iijima Electronics Corporation

MA300TS-0210

Table of Contents

1. Safety Precautions

This section explains the precautions that must be observed to prevent injury to the user or other persons or damage to property.

The following symbols classify and explain the degree of harm or property damage that may result if the contents of the symbols are ignored and the product is used improperly.

Caution	This symbol indicates the extent of harm or damage that could potentially result in injury or physical damage if the information is ignored and the product is handled incorrectly.
Note	This symbol indicates a situation in which the measurement could be adversely affected, preventing correct measurement results from being obtained if the information is ignored and the product is handled incorrectly.

Caution

- If a 3-way check valve is inadvertently used when measuring a sample containing fibers or solids, the valve could become clogged, and the measurement will not be possible. Exchange the 3-way check valve with the enclosed 3-way cock. (Refer to section “5. Measurement (3) Measuring a sample containing fibers or solids” on page 15 of this manual.)

- The key components are made of acrylic materials. Acrylic materials have a low resistance to solvents such as alcohol, so do not measure such matters. The acrylic material could be adversely affected, such as cracking the acrylic material.

Note

- Avoid taking measurements in conditions where the temperature changes. Temperature changes may cause air bubbles to form in the sample being measured, and this may cause measurement errors.

- If there is a temperature difference between the measurement sample and this device, make sure to match the temperatures before measurement.
  For example, if the sample has been stored in a refrigerator, let it sit until it reaches room temperature, and then measure, taking care not to inhale any of the air bubbles generated.

- Samples containing milkfat ingredients should be measured at the end of the measurement session. After measuring, clean the device thoroughly.

2. Confirmation of package contents

When unpacking the DO Measuring Device, confirm that the following items are included and that the contents have not been damaged. If any parts are missing or damaged, contact the dealer from which you purchacedthe product.

(1) Package contents

	Description	Quantity
(1)	DO measuring device (Model: MA-300)  → Housing section (enlarged)  Magnetic stir bar Syringe section (enlarged)  With 3-way check valve Beaker (with tubing holder)  * When the product is shipped, the tubing part is not connected.	1
(2)	Oxygen sensor (WAGNIT®) (Model: WA-BRM5) Membrane solution set (Model: GT-41) x 1 set is enclosed. *"WAGNIT®" is a registered trademark of the Iijima Electronics Corporation oxygen sensor. 	1
(3)	Maintenance parts (spare parts) • Lifelon tubing (Φ2×4 mm) 1.5 m [Manufacturer] KOKUGO Co., Ltd. [Part No.] 02-048-01-02 • 3-way check valve x 1 pc. [Manufacturer] ISIS Co., Ltd. [Part No.] VCV1251 	1 set
(4)	3-way cock (Part for measuring samples containing fibers or solids) Model: VXB1079 Manufacturer: ISIS Co., Ltd. Material: Polycarbonate/polyethylene 	1
(5)	Cleaning brush Part name: Blood sedimentation brush (Model: 7-5611-01) Distributor: AS ONE Corporation 	1
(6)	Anhydrous sodium sulfite, Guaranteed Reagent 100 g pack (For preparing zero-calibration solution) 	1
(7)	Operation manual (this document)	1

* When purchasing additional consumable parts or spare parts for items (3) to (6), please refer to the part names and models indicated above and contact your dealer or a laboratory equipment dealer.

(2) Accessories (options)

	Description
(8)	Stirrer (model: KK) Product name: Ultra-Flat Digital Mini Magnetic Stirrer Distributor: KENIS, Ltd. 

3. Names and functions of each part

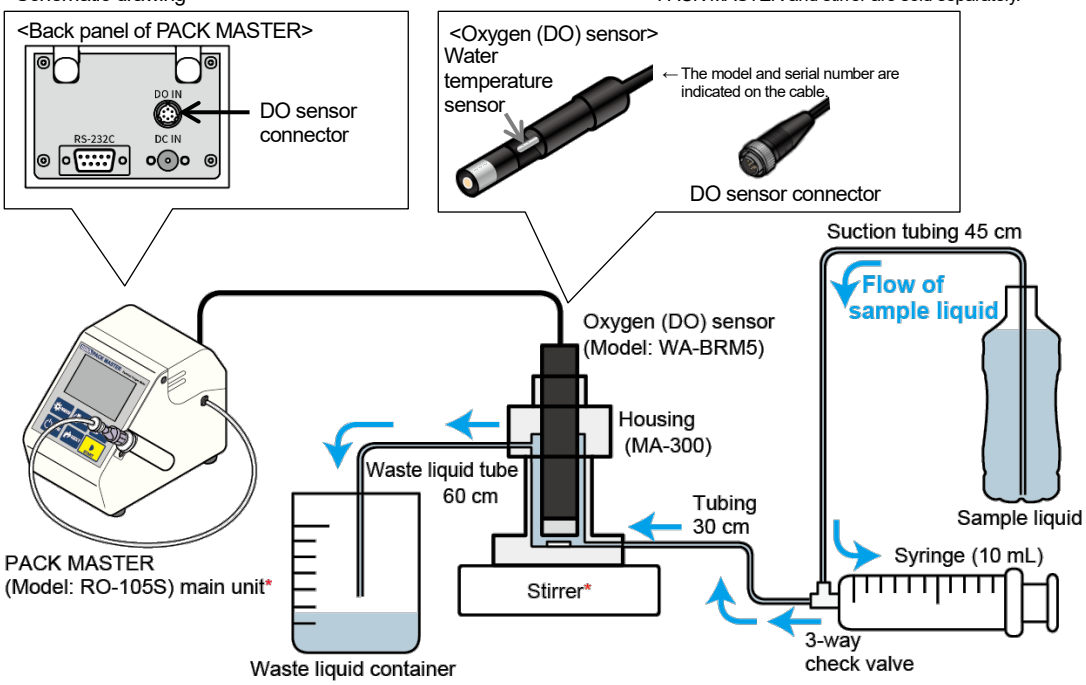
This device is shipped with part of the tubing parts removed so that excessive load is not applied on each part. Before starting use, refer to the schematic drawing below, connect each part, and install the device. The tubing is manually tightened with a luer fitting.

Caution

Do not use a tool when connecting the parts. Tightening with a tool could result in part damage.
Securely tighten the parts by hand without using tools.

<Schematic drawing>

* PACK MASTER and stirrer are sold separately.



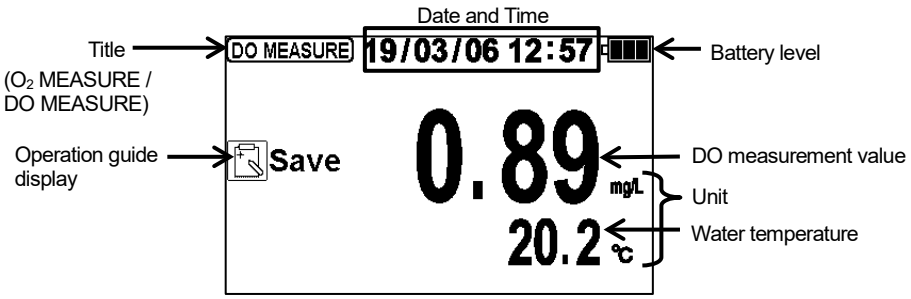
The following photo shows the overall view, including the optional PACK MASTER (model: RO-105S), Stirrer (Model: KK), and sample prepared by the user.

(1) Main unit display area (LCD display area)

The following screen appears when the oxygen sensor (WA-BRM5) is connected to the PACK MASTER and the DO measuring mode is set.

(Refer to section “4. Preparing for measurement (1) PACK MASTER (RO-105S) settings” on page 6 for details on setting the measurement mode.)

<When DO MEASURE screen [mg/L] is displayed>



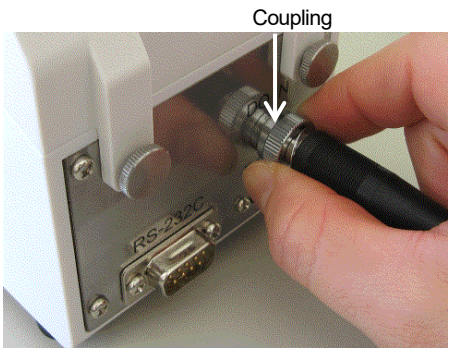
(2) Connection procedures

Step 1. Connect the PACK MASTER and oxygen sensor.

Remove the black cap attached to the DO sensor connector (marked with “DO IN”) on the back panel of the PACK MASTER.

Remove the pin shorting cap from the oxygen sensor and connect the connector part.

Carefully align the connector pins with the position of the hole. Connect the connector and turn the coupling to fix it.



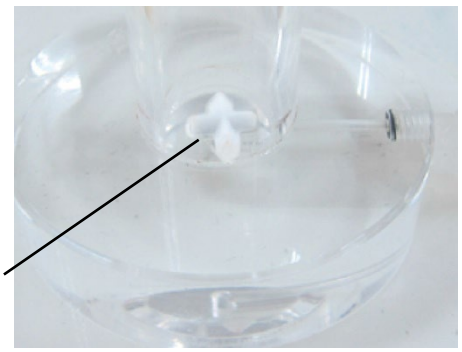
Step 2. Connect the tubing between the syringe and housing.

Step 3. Install the stirrer.

Place the magnetic stir bar in the housing.

Place the housing over the stirrer and turn the stirrer power ON. Adjust the position so that the magnetic stir bar comes to the center of the housing.

Finely adjust the position when mixing with the stirrer during the measurement.



4. Preparing for measurement

(1) PACK MASTER (RO-105S) settings

Before starting the DO measurement, set and confirm the 1. Measurement mode, 2. DO display, and 3. Span calibration method on the PACK MASTER main unit.

The set details are saved even if the PACK MASTER power is turned OFF, the batteries are removed, or the AC adapter is disconnected. Note that the details are not saved when the oxygen sensor (WA-BRM5) is disconnected.

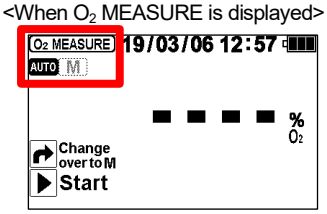
1. Measurement Mode (O_2/DO) setting

Step 1. Confirm that the oxygen sensor (WA-BRM5) is connected.

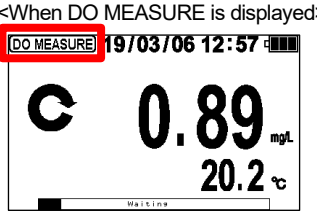
Step 2. Turn the PACK MASTER power ON, and press SEL on the Measurement Standby screen.

The mode switches to the DO MEASURE mode.

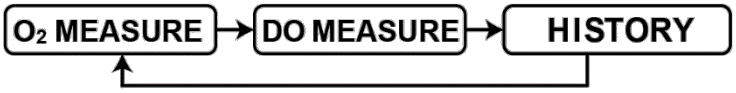
<When O_2 MEASURE is displayed>



<When DO MEASURE is displayed>



The display alternates in the following order each time SEL is pressed.



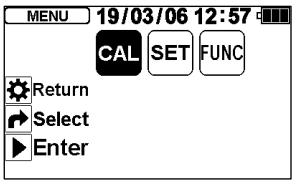
Note

- DO MEASURE cannot be selected unless the oxygen sensor (WA-BRM5) is connected to the PACK MASTER (RO-105S).
- The mode cannot be selected when the PACK MASTER's key lock function is enabled. Disable the key lock function before selecting the mode. (Refer to the "Key Lock / Unlock Function" section in the PACK MASTER Operation Manual for details on the operation.)

2. DO Display (DO [mg/L] / Saturation rate [%] setting)

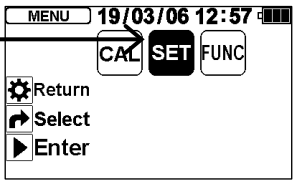
Step 1. Turn the PACK MASTER power ON, and press MENU on the O_2 Measurement Standby screen or DO MEASURE screen.

The MENU screen opens, and "CAL" is selected (flashes).



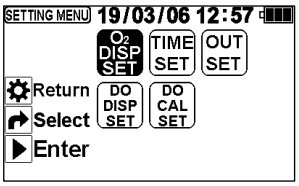
Step 2. Press NEXT once.

The cursor moves, and "SET" is selected (flashes).



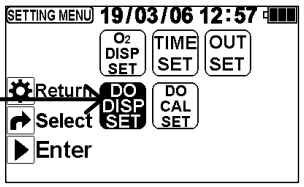
Step 3. Press START.

The SETTING MENU screen opens, and "O_2 DISP SET" is selected (flashes).



Step 4. Press NEXT three times.

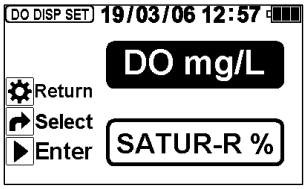
The cursor moves, and "DO DISP SET" is selected (flashes).



Step 5. Press START.

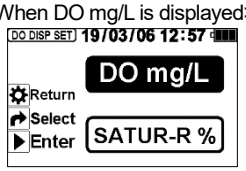
The DO DISP SET screen opens, and the selected setting flashes.

* The factory default setting is "DO mg/L".

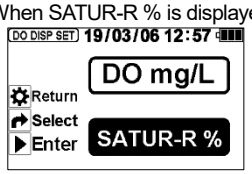


Step 6. Each time NEXT is pressed, the display changes as shown below.

<When DO mg/L is displayed>



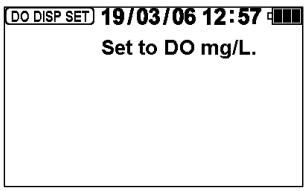
<When SATUR-R % is displayed>



Step 7. When START is pressed, the selected settings are saved.

The SETTING MENU screen opens.

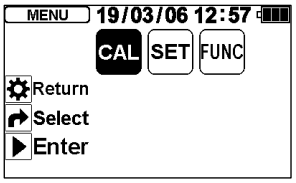
<When set to DO mg/L>



3. Setting the Span Calibration Method (Saturated water calibration/air calibration)

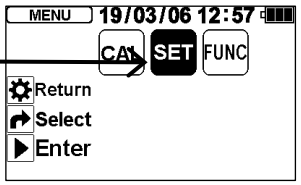
Step 1. Turn the PACK MASTER power ON, and press MENU on the O_2 Measurement Standby screen or DO MEASURE screen.

The MENU screen opens, and "CAL" is selected (flashes).



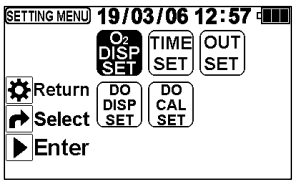
Step 2. Press NEXT once.

The cursor moves, and "SET" is selected (flashes).



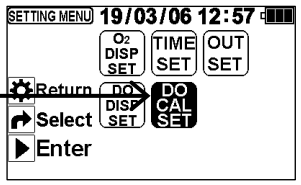
Step 3. Press START .

The SETTING MENU screen opens, and "O_2 DISP SET" is selected (flashes).



Step 4. Press NEXT four times.

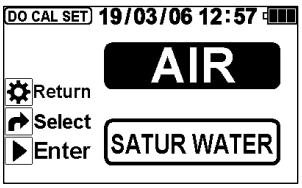
The cursor moves, and "DO CAL SET" is selected (flashes).



Step 5. Press START .

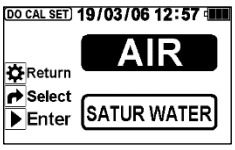
The DO CAL SET screen opens, and the selected setting flashes.

* The factory default setting is "AIR".

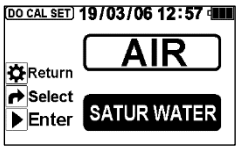


Step 6. Each time NEXT is pressed, the display changes between "AIR" and "SATUR WATER".

<When AIR is displayed>



<When SATUR WATER is displayed>

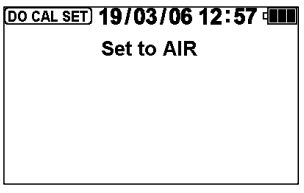


Display symbol	Name
AIR	Air calibration
SATUR WATER	Saturated water calibration

Step 7. When START is pressed, the selected settings are saved.

The SETTING MENU screen opens.

<When Set to AIR is selected>



(2) Span calibration

Perform span calibration once a day before starting measurements using the following procedure.

There are two types of span calibration: air calibration and saturated water calibration. Refer to the following explanation and procedure, and select the span calibration method that matches your application.

1. Air calibration method

This simple calibration method calibrates using the atmosphere.

It is an easy calibration method, but it may be affected by changes in the atmospheric temperature around the water temperature sensor.

Step 1. Release the oxygen sensor to the atmosphere and stabilize the temperature.

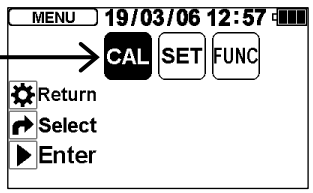
The sensor cannot be calibrated accurately if the temperature changes. Sufficiently stabilize the temperature when the atmospheric temperature is stable, such as before turning on the air conditioning.

Step 2. Change the instrument setting to "Set to AIR". (Perform only the first time.)

Refer to section "3. Setting the Span Calibration Method (Saturated water calibration/air calibration)" on page 8 of this manual.

Step 3. When the DO MEASURE screen is displayed, press MENU **.**

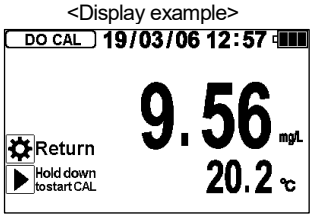
The MENU screen opens, and "CAL" is selected (flashes).



Step 4. Press START **.**

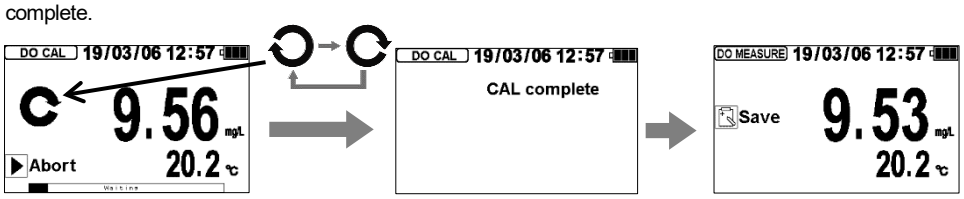
The DO CAL screen opens.

<Display example>



Step 5. When the indicated value stabilizes, hold down START **for 1 second or longer.**

The stability is decided, and after approx. 10 seconds "CAL complete" appears to indicate that the calibration is complete.



The DO MEASURE screen opens when the calibration is completed.

The calibration value is saved even if the PACK MASTER power is turned OFF, the batteries are removed, or the AC adapter is disconnected.

If an error message appears during the calibration, refer to the "Error Messages" section on page 19 of this manual and the "Error Messages" section in the PACK MASTER Operation Manual.

2. Saturated water calibration method

This calibration method follows JIS K0102. Calibration is performed using saturated water with dissolved oxygen (hereinafter, saturated water).

Step 1. Prepare the saturated water.

Fill a beaker with water, and perform aeration. (500 mL of water must be aerated for approx. 10 to 20 minutes.)

Step 2. Change the PACK MASTER setting to "SATUR WATER". (Perform only the first time.)

Refer to section "3. Setting the Span Calibration Method (Saturated water calibration/air calibration)" on page 8 of this manual.

Step 3. Fill the housing with saturated water.

Refer to Steps 1 to 4 in section "5. Measurement (1) Measuring a sample" on page 13 of this manual.

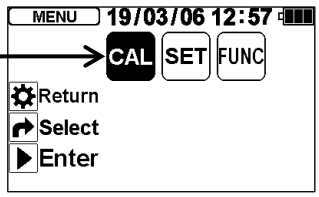
Step 4. Spin the stirrer and mix the saturated water in the housing.

Allow five to ten minutes for the temperature to stabilize.

If the temperature varies, it can take approximately one minute per degree Celsius to stabilize.

Step 5. When the DO MEASURE screen is displayed, press MENU **.**

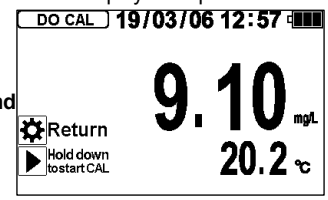
The MENU screen opens, and "CAL" is selected (flashes).



Step 6. Press START **.**

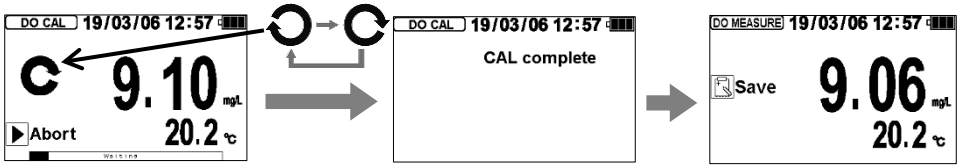
The DO CAL screen opens.

<Display example>



Step 7. When the indicated value stabilizes, hold down START **for 1 second or longer.**

The stability is decided, and after approx. 10 seconds "CAL complete" appears to indicate that the calibration is complete.



The DO MEASURE screen opens when the calibration is completed.

The calibration value is saved even if the PACK MASTER power is turned OFF, the batteries are removed, or the AC adapter is disconnected.

If an error message appears during the calibration, refer to the "Error Messages" section on page 19 of this manual, and the "Error Messages" section in the PACK MASTER Operation Manual.

Note Prepare the saturated water at the time of use, not in advance.

(3) Zero calibration

To measure low concentrations accurately, or if the value when measuring low concentrations seems abnormal (negative display or a higher value than usual), perform zero calibration following the procedure below.

Step 1. Prepare the zero standard liquid (zero water).

Dissolve 5 g of sodium sulfite in a container such as a beaker, and add water so that the total volume is 100 mL. (When preparing enough liquid to change the entire amount, adjust with the same ratio.)

Stir until the sodium sulfite completely dissolves. The sodium sulfite will dissolve more easily if added to the water while stirring. Avoid making air bubbles when stirring.

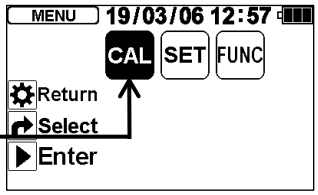
Step 2. Directly place the oxygen sensor in the container holding the zero water. (The housing is not used.)

Wait approx. ten minutes for the indicated value to drop to about 0.00 mg/L.

Make sure that there are no air bubbles on the tip of the sensor.

Step 3. When the DO MEASURE screen is displayed, press MENU.

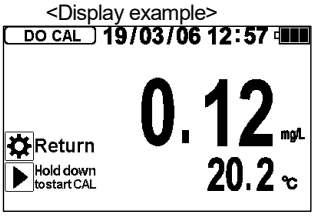
The MENU screen opens, and “CAL” is selected (flashes).



Step 4. Press START.

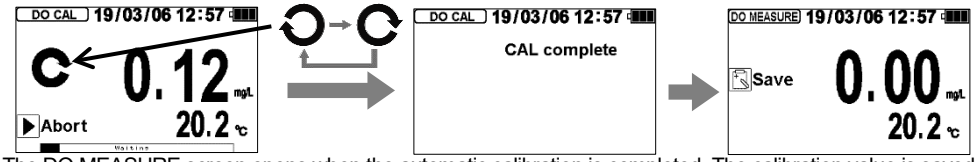
The DO CAL screen opens.

<Display example>



Step 5. When the indicated value stabilizes, hold down START for 1 second or longer.

The stability is decided, and after approx. 10 seconds “CAL complete” appears to indicate that the calibration is complete.



The DO MEASURE screen opens when the automatic calibration is completed. The calibration value is saved even if the PACK MASTER power is turned OFF, the batteries are removed, or the AC adapter is disconnected.

If an error message appears during the calibration, refer to the “Error Messages” section on page 19 of this manual, and the “Error Messages” section in the PACK MASTER Operation Manual.

Step 6. Wash the oxygen sensor with tap water filled in a container such as a beaker.

Refer to section “6. Maintenance (1) Cleaning after the measurement” on page 16 of this manual.

Note

- Prepare the zero water at the time of use, not in advance.
- Perform zero calibration with a container such as a beaker. Do not use the housing. If the zero water passes through the housing, the residual amount of zero water left in the housing or tubing after zero calibration could affect the ensuing sample measurement values.
- When the zero calibration is completed, always clean the oxygen sensor with tap water. If a measurement is performed without cleaning the sensor, the residual zero water could affect the measurement values.

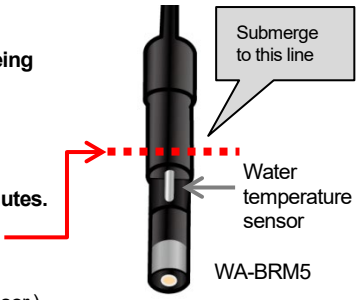
Caution

Always clean the oxygen sensor with tap water filled in a container such as a beaker. If cleaned with tap water directly from the faucet, the pressure of the water could break the membrane on the sensor surface.

(4) Water temperature adjustment

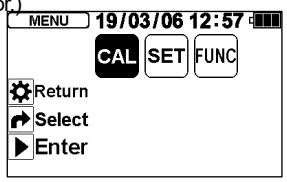
* The water temperature is adjusted at the time of shipment, so normally, this procedure is not required.

If the deviation of the sample water's temperature is a concern, the water temperature display can be adjusted manually using a standard thermometer. The temperature can be adjusted in the range of **-5°C to +5°C** from the currently displayed temperature.

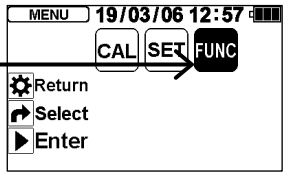


Step 1. Prepare water at a temperature similar to the sample water currently being measured in a constant temperature bath, etc.
Set the oxygen sensor (WA-BRM5) and standard thermometer in the prepared water.
Mix with a stirrer, etc., and allow the water to stabilize for approx. 5 minutes.
Ensure that the water temperature sensor section of the oxygen sensor is completely submerged in the water.
(The sensor is not completely waterproof, so do not submerge the entire sensor.)

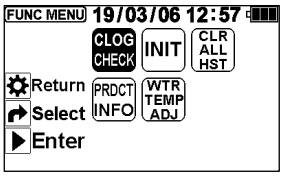
Step 2. Turn the PACK MASTER power ON, and press MENU on the O_2 Measurement Standby screen or DO MEASURE screen.
The MENU screen opens, and "CAL" is selected (flashes).



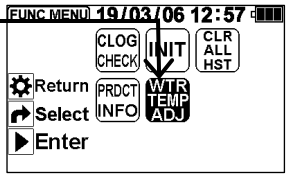
Step 3. Press NEXT twice.
The cursor moves, and "FUNC" is selected (flashes).



Step 4. Press START.
The FUNC MENU screen opens, and "CLOG CHECK" is selected (flashes).



Step 5. Press NEXT four times.
The cursor moves, and "WTR TEMP ADJ" is selected (flashes).

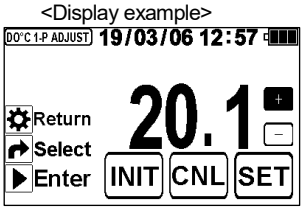


Step 6. Press START.
The "DO°C1-P ADJUST" screen opens.

Step 7. Change the water temperature to be adjusted with the following steps.
Press NEXT. The cursor will move in the order of

+ → − → INIT → CNL → SET. When START is pressed, the cursor function will activate.

<Display example>



<Cursor functions>

+	The water temperature display is increased by 0.1°C.	INIT	The setting is returned to the factory default setting.
−	The water temperature display is decreased by 0.1°C.	CNL	Adjustment of the water temperature is canceled.
SET	The input water temperature value is saved in the main unit, and the FUNC MENU screen opens.		

Step 8. Select SET, CNL, or INIT, and then press START.
The process to save the water temperature adjustment value is completed or canceled (initialization is completed when initializing), and then the FUNC MENU screen opens.

5. Measurement

This device is an option for the PACK MASTER (RO-105S). Dissolved oxygen (DO) in liquid can be measured with limited exposure to air using this device.
The measurement value can be measured and saved as either the dissolved oxygen amount (mg/L) or dissolved oxygen saturation rate (%).

Note

- When the ambient temperature changes, such as when the measurement environment has changed due to unpacking or relocation of the device installation place, the temperature change may cause the indicated value to fluctuate gradually. In this case, set the oxygen sensor in this device and expose it to the atmosphere for 30 minutes or longer so that the temperature sufficiently stabilizes
- Do not use a 3-way check valve to measure samples containing fibers or solids.
- When measuring a sample containing fibers or solids, refer to section “5. Measurement (3) Measuring a sample containing fibers or solids” on page 15 of this manual.

(1) Measuring a sample (Sample that does not contain fibers or solids)

Step 1. Carefully mount the oxygen sensor (WA-BRM5) on the housing unit.

Note

- Do not insert the oxygen sensor forcefully.
  Forcefully inserting the sensor can apply a load on the membrane and affect the measurement value.
- If there is a gap between the oxygen sensor and housing unit, the solution will not be mixed properly and the measurement value will be affected.
  Completely insert the oxygen sensor into the back of the housing so that there is no gap.

Step 2. Set the sample.

Note

- Avoid exposing the sample to the atmosphere when setting it. Set the suction tubing so it is as close to the bottom as possible.
- When suctioning the sample, suction from the bottom of the container as much as possible. If the sample is taken from close to the water surface, the air may dissolve in the sample and cause a measurement error.

Step 3. Using a syringe, feed the sample into the housing.

Slowly pull out the syringe plunger taking approx. 5 seconds to suction 10 mL of the sample. Then slowly push in the syringe plunger taking approx. 5 seconds to discharge all of the sample solution in the syringe.

(The sample is fed into the housing with this suction and discharge process.)

Slowly move the syringe plunger so that air bubbles do not form in the measurement sample in the housing.

When suctioning for the first time, air bubbles will enter the syringe. Hold the syringe upwards and move the plunger to discharge the air bubbles.

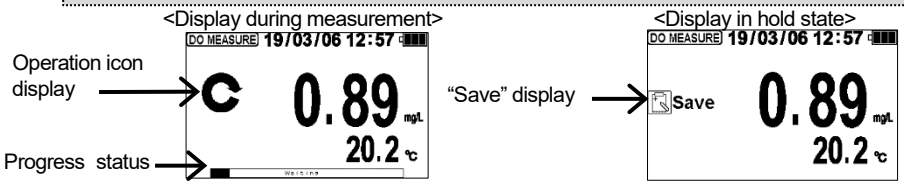
Step 4. Repeat this suction and discharge process.

Repeat the suction and discharge process in Step 3 one to two times to feed a total of **20 to 30 mL** of sample into the housing. The syringe does not need to be facing upward after the second time.

Step 5. Spin the stirrer to mix the solution.

The automatic stability decision function automatically decides the stability of the indicated value, and holds the stabilized value.

The “automatic stability decision function” eliminates the read indicated value variation. When the measurement is started, the stability of the indicated value is automatically decided and is then held or canceled.



Caution

If the stirrer is rotated at high speed, the magnetic stir bar may pop off with force and damage the oxygen sensor. Gradually increase the stirrer speed.

Note

- If the stirrer speed is too slow, the flow will be insufficient, and the measurement value may be low. Adjust the speed to the maximum speed that does not cause the magnetic stir bar to pop off. The recommended speed for the stirrer (Model: KK accessory) is 1,100 to 1,400 rpm. (For similar viscosity as water)
- To ensure an accurate measurement, adjust the stirrer speed during calibration and measurement.

Step 6. To save the measurement value in the main unit, press the MEMO key.

”Save Complete” is displayed, and the previous stability decision value is saved in the measurement history by the memory function.

The “Memory Function” saves the held measurement value as the measurement history. If the MEMO key is pressed while “Save” is displayed, the measured value will be saved in the main unit as the measurement history. The saved details are retained even if the power is turned OFF, the batteries are removed, or the AC adapter is disconnected.

Press SEL on the Measurement Standby Screen to confirm the measurement history. The Measurement History Screen will open. Refer to the “Measurement and recording” section in the PACK MASTER Operation Manual for details on the functions and operations.

(2) Repeated measurement (repeatedly measuring several samples)

To measure multiple samples repeatedly, repeat Step 2 to Step 5 in section “5. Measurement (1) Measuring a sample” on page 13 of this manual.
There is no need to operate the syringe in an upward direction during Step 3 in this case.

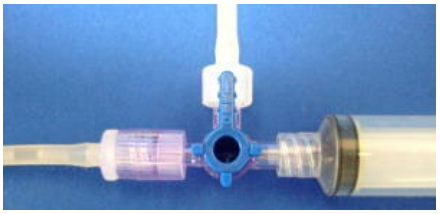
> **Note**
> When measuring a 350 mL sample, complete the measurement within three minutes of opening the plug. If it takes longer, the oxygen in the atmosphere will cause the measurement value to be higher.

(3) Measuring a sample containing fibers or solids

Step 1. Exchange the 3-way check valve with the 3-way cock.


3-way check valve

Exchange


3-way cock

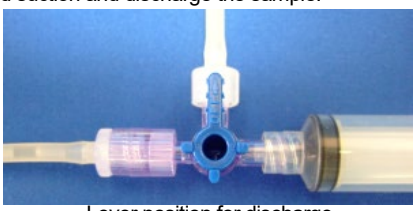
Step 2. Take the measurement while switching the lever position for suctioning and discharge.

Refer to the syringe operation explained in Step 3 of section “5. Measurement (1) Measuring a sample” on page 14 of this manual, and take the measurement.

[Cock position during suction and discharge]

Switch the lever on the 3-way cock as shown in the photo and suction and discharge the sample.


Lever position for suction


Lever position for discharge

6. Maintenance

(1) Cleaning after measurement

1. Cleaning the MA-300

When finished measuring the sample, discharge the sample remaining in the syringe, housing, and tubing. Suction and discharge tap water by operating the syringe in the same manner as measuring a sample.
If the parts are heavily contaminated, clean with a neutral detergent, etc., and allow to dry. If the injection inlet or discharge outlet of the housing, etc., are clogged, use the enclosed cleaning brush to remove the clogged matter.

Caution

- Never use an ultrasonic cleaner to clean the parts. There is a risk of cracking.
- Never use alcohol or solvent when cleaning. There is a risk of housing clouding or cracking.
- Before removing the oxygen sensor, remove all sample solution and tap water in the device and make sure that negative pressure is not generated in the housing. Negative pressure in the housing could damage the oxygen sensor's membrane.

2. Cleaning and storing the oxygen sensor

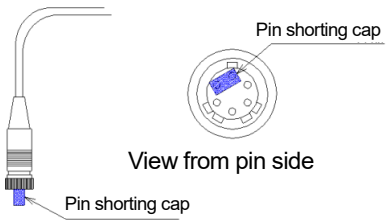
Clean the oxygen sensor when finished with zero calibration or measuring the sample.

Step 1. Fill a container, such as a beaker with tap water, and lightly rinse the oxygen sensor in the container.
Always clean the oxygen sensor with tap water filled in a container. If cleaned with tap water directly from the faucet, the pressure of the water could break the membrane on the sensor surface.

Step 2. Wipe off the moisture lightly with tissue paper and store the sensor in the atmosphere.

Note

When removing the oxygen sensor from the main unit and storing it, always attach the pin shorting cap as shown on the right to maintain the quality.



(2) Replacing the oxygen sensor membrane and electrolytic solution

In principle, the oxygen sensor (WA-BRM5) will degrade over time. The oxygen sensor membrane and electrolytic solution must be replaced in the following cases. When making the replacement, use the enclosed "Membrane solution set (Model: GT-41)."
Refer to the replacement procedures in the "Maintenance Guide" enclosed with the oxygen sensor and correctly replace the parts.

- When the "Sensor Error" message is displayed.
- When the measurement value stabilizing time is slow.
- When residues appear in the oxygen sensor's electrolytic solution. (White or yellow powder, etc.)
- When use has been suspended for a long time (several months).
- When the membrane is damaged.

7. Troubleshooting

If you suspect any malfunction or trouble, always perform the following confirmation and remedy before requesting repairs.
If the symptoms do not subside, contact the dealer from which you purchased the product.

Symptom	Confirmation	Action
The value is high. The value does not change (does not lower).	Was air inadvertently suctioned during the measurement?	Dispose of the sample solution being measured, and start the measurement from the beginning.
	Was the span calibrated?	Calibrate the span. (Refer to pages 9 to 10.)
	Was the membrane on the tip of the oxygen sensor facing upward when calibrating the span?	Point the membrane on the tip of the oxygen sensor downward or to the side when calibrating the span.
	Is the oxygen sensor being used after being suspended for a long time (several months)?	The oxygen sensor membrane and electrolytic solution may be degraded. Replace the membrane and electrolytic solution with new ones. After replacing, allow the sensor to stabilize for several hours to 12 hours or more, and then calibrate it.
	Is the membrane on the top of the oxygen sensor contaminated?	Clean the oxygen sensor and remove the contaminants. (Refer to section “6. Maintenance (1) Cleaning after measurement” on page 16.) If the contaminants cannot be removed, replace the membrane and electrolytic solution with new ones. After replacing, allow the sensor to stabilize for several hours to 12 hours or more, and then calibrate it.
	Was zero calibration performed?	Perform zero calibration. (Refer to page 11.) Use zero standard solution (zero water) that has been prepared just before the calibration, not solution made in advance.
	If the symptoms do not improve after taking the above actions, the oxygen sensor may have reached its life.	Order a new oxygen sensor and replace the old one.
The value is low.	Is the stirrer creating an appropriate flow?	The measurement value can be low if the stirrer speed is too low, causing the flow to be insufficient. Adjust the speed to the maximum speed that does not cause the magnetic stir bar to pop off. (Refer to page 14.)
	Was the span calibrated?	Calibrate the span. (Refer to pages 9 to 10.)
	Was the membrane on the tip of the oxygen sensor facing upward when calibrating the span?	Point the membrane on the tip of the oxygen sensor downward or to the side when calibrating the span.

<table>
<tr><td rowspan="4"></td><td>Is the oxygen sensor being used after being suspended for a long time (several months)?</td><td>The oxygen sensor membrane and electrolytic solution may be degraded. Replace the membrane and electrolytic solution with new ones. After replacing, allow the sensor to stabilize for several hours to 12 hours or more, and then calibrate it.</td></tr>
<tr><td>Is the membrane on the tip of the oxygen sensor contaminated?</td><td>Clean the oxygen sensor and remove the contaminants. (Refer to section “6. Maintenance (1) Cleaning after measurement” on page 16.)
If the contaminants cannot be removed, replace the membrane and electrolytic solution with new ones. After replacing, allow the parts to stabilize for several hours to 12 hours or more, and then calibrate.</td></tr>
<tr><td>Was zero calibration performed?</td><td>Perform zero calibration. (Refer to page 11.)
Use zero standard solution (zero water) that has been prepared just before the calibration, not solution made in advance.</td></tr>
<tr><td>If the symptoms do not improve after taking the above actions, the oxygen sensor may have reached its life.</td><td>Order a new oxygen sensor and replace the old one.</td></tr>
<tr><td>Contaminants have solidified in the housing.</td><td colspan="2">Fill the housing with lukewarm water and allow it to soak. Then, wipe off the contaminants with a soft sponge, etc.
If the solution contains oils and fats, soak the sensor in a neutral detergent, and wipe off the contaminants with a soft sponge, etc.
* Do not use alcohol when cleaning. Do not use a metal brush or hard sponge.</td></tr>
<tr><td rowspan="2">Solids were suctioned with the sample water and got clogged in the tubing.</td><td colspan="2">When using the 3-way check valve, replace the 3-way check valve with a new one.</td></tr>
<tr><td colspan="2">If the injection section or discharge section is clogged, use the enclosed cleaning brush and remove the clogged matter as shown in the photo.
<Example of using cleaning brush>
 
If the cleaning brush is not available, it may be possible to remove the clogged material by attaching the syringe directly to the injection/discharge section and applying pressure.</td></tr>
</table>

Reference: Refer to the Iijima Electronics Corporation website for information on troubleshooting, handling, and maintenance.
https://www.iijima-e.co.jp/
Contact the dealer from which you purchased the product if you have any questions or inquiries regarding handling.

8. Error Messages

An error message may display during the self-diagnosis during use. Check the details of the displayed error, and troubleshoot with the following actions.

Symptom	Confirmation	Action
Sensor error  • The sensor output is unstable during span calibration or zero calibration. • The sensor output is unstable during measurement. • The ambient temperature has changed drastically. • The oxygen sensor membrane is damaged.	Is the oxygen sensor correctly mounted?	Securely connect the oxygen sensor (WA-BRM5) to “DO IN” on the back panel of the PACK MASTER. (Refer to page 5.)
	Has the temperature of the measurement environment changed drastically? (Temperature difference between storage site and measurement site, temperature change caused by air conditioning, etc.)	The device cannot be calibrated correctly if the temperature changes drastically. Calibrate the span after allowing the temperature to stabilize sufficiently in a stable ambient temperature, such as before turning on the air conditioning.
	Was the membrane on the tip of the oxygen sensor facing upward when calibrating the span?	Point the membrane on the tip of the oxygen sensor downward or to the side when calibrating the span.
	Was stabilizing time taken after replacing the oxygen sensor membrane and electrolytic solution?	When the membrane and electrolytic solution have been replaced, the membrane tension is not stable, so allow the membrane to settle for several hours to 12 hours. Calibrate after this stabilizing time.
	Is the oxygen sensor’s membrane surface damaged or wrinkled, etc.?	Refer to the “Maintenance Guide” enclosed with the oxygen sensor and replace the membrane and electrolytic solution with new ones. After replacing, allow the parts to stabilize for several hours to 12 hours or more, and then calibrate.
	Is the membrane on the tip of the oxygen sensor contaminated?	Clean the oxygen sensor and remove the contaminants. (Refer to section “6. Maintenance (1) Cleaning after measurement” on page 16.) If the contaminants cannot be removed, replace the membrane and electrolytic solution with new ones. After replacing, allow the parts to stabilize for several hours to 12 hours or more, and then calibrate.
	Is the oxygen sensor being used after being suspended for a long time (several months)?	The oxygen sensor membrane and electrolytic solution may be degraded. Replace the membrane and electrolytic solution with new ones. After replacing, allow the sensor to stabilize for several hours to 12 hours or more, and then calibrate it.
	If the symptoms do not improve after taking the above actions, the oxygen sensor may have reached its life.	Order a new oxygen sensor and replace the old one.
	If the symptoms do not improve even after replacing the oxygen sensor, the main unit may be faulty.	Make a request for repairs.

If any other error message is displayed, refer to “Error Messages” section in the PACK MASTER Operation Manual.

Please contact the dealer from which you purchased the product if you have any questions or inquiries regarding handling, repairs, or inspections.

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