



# **Instruction Manual**

Model DO-350L (DO/O2/AIR/ pO2/TEMP)

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# Chapter I. Instruction

This desktop Meter (Model DO-350L), the latest- model is operated by AC/DC adaptor (DC 12V), a high performance model controlled by microprocessor for all measurement needs.

The model DO-350L is capable of storing up-to 500 points in its memory box and storing by control of the time interval of data-log automatically. And also, by using RS232C cable, it can be remotely controlled and transmitted the measured information to the printer or computer by 1 second interval.

### DO-350L (DO/O2/AIR/ pO2/TEMP)

If a pH value is stable, a world "Stable" is displaying on the screen, therefore a user can measure the sample more accurately. And it features Auto/Manual calibration and displays DO (mg/l),  $O_2$ ,  $pO_2$ , Air and temp (°C)

- **DO** Displays concentration of dissolved oxygen with range of 0.00 to 19.99 mg/L.
- **O2** Indicates percentage of oxygen as compared to the amount of oxygen presents in the air.
- **Air** Indicates percentage of DO concentration.
- **Alt** Indicates Altitude by meter. It is shown in Setup mode.
- ATC Indicates Automatic Temp Compensation, a temperature probe supplied by istek must be used. Temperature Compensation is automatically performed indicates present temp and in case of it is unconnected with the meter, it displays 25℃.



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# Chapter II. General Functions

#### 2.1 Instrument Setup





**Rear Panel of DO-350L** 

#### **Power Source**

Connect the supplied AC/DC adaptor to Power Jack of the meter. istek supplies **AC/DC adaptor(DC 12V) adjusting to 220V.** 

#### With built-in Printer: 12V, 3A Without built-in Printer: 12V, 1A

This meter can be used in free voltages and if you would like to use this to 110V, just use a proper connector for inserting a users plug.

#### Sensors and ATC probe Connecting

We recommend using electrodes which were provided by istek, Inc. for optimum working. Put it into BNC Jack and turn it clockwise to lock into position. And Attached ATC probe to the ATC jack by sliding the connector straight on until firmly in place.

#### RS232C interface cable Connecting

Using this RS232C Interface cable, it is available to connect the meter with Printer (Or Computer) and user can edit or print the data easily. For further information, please refer the Chapter 4 <Data -Log> Part





# 2.2 Display Description

This is an initial display of DO-350L.

#### Initial display of DO-350L



Display	Function
DO	Indicates Concentration of Oxygen presents in the water.
02	Indicates Percentage of Oxygen which is based Amount of oxygen presents in the air.
Air	Indicates Percentage of Dissorlved Oxygen or $O_2$ Concentration.
Setup	Indicates to change each selected value per measuring Item
Cal	Indicates that meter is in calibration condition
Memory	Indicates for confirming each saved data per Item
Help	Indicates to check interior simplicity manual which is saved in instruments
Message	When you select each Menu or item, this message is appeared
05/08/24	Indicate of using data of the instrument
15:00:32	Indicate of using time of the instrument





### 2.3 Electrode Structure

#### DO Polarographic Probe Storage & Maintenance



- 1. Electrode Body
- 2. Stainless Steel Ring
- 3. Screw
- 4. Sensor; position of response to oxygen
- 5. Membrane Cover; containing with the filling Solution
- 6. Membrane Protector& Holder
- 7. Membrane

#### **Probe Storage and Maintenance**

- DO Probe Storage For longer storage, cover the membrane tip with a cap originally supplied by *istek*.

- DO Probe Maintenance (Probe Cleaning)

If it takes long time to response or a stable data is not obtained, check

membrane. If air bubble is occurred on membrane, remove air bubble.

Check membrane for damage (i.e. holes and leak, etc.). If membrane gets damage, replace membrane.





# Chapter III. Setup Functions

### 3.1 Setup in DO Mode

#### 3.1.1 Setup in DO Mode

From the Initial display, select <DO> Item by pressing **Move Key**. After selecting <DO> and press **Memory/Out Key**, then below (right one) is displayed. From the display, move to <Setup> by using **Move Key**. Each single item can be selected by pressing **Enter Key**.

#### 3.5.1.1 Setting Salinity and Altitude in Setup menu.

In DO Setup, press Enter Key to select Salinity and Altitude

Select DO by using **Move Key** and **Enter Key.** After selecting DO then, press **Memory/Out Key** to enter DO Mode (Left picture). User can move easily to Main Menu by pressing **Move Key**. Press **Enter Key** from Setup mode to enter Setup Mode.





#### Setting Salinity and Altitude in Setup menu.

In Setup Mode, press **Enter Key** to select Salinity and Altitude User input data by pressing **Up/Down Key**.

- (1) Salinity: 0 to 70 ppt. It changes 0.1 for every one press.
- (2) Altitude: 0 to 4,000m. It changes 50m for every one press.







Setup Cal Mer	nory Help Item	Setup	Cal	Merr	югу	Help	Item
DO		DO					
Salinity		Altitude					
0.0 ppt					С	me	ter
Message	05/08/24 15:00:32	Messag	je		05/0	8/24 1	5:00:32
* Value setting:[Up] / [Down] * Save & Exit:[Memory]		* Value * Save	setti & Exi	ng:[  t:[M	Up]/ Iemoi	/ [Dow 'y]	/n]

#### Setting Temp in Setup menu.

In DO Setup Mode, press **Move Key** to move to Temp and press **Enter Key.** The following screen will be shown.

Setup Cal	Memory Help Item	1	Setup	Cal	Меп	югу	Help	Item
Channel 2		1	Channe	el 1				
DO ch1 ch2 ch3 Rear View				25	5.0	) '	С	
Message	05/08/24 15:00:32	1	Messag	ge		05/08	3/24 15	:00:32
* RS232 output : Computer * Interval : 0 sec			* Value * Save	e setti & Ex	ing:[ it:[M	Up]/ Iemoi	/ [Down ry]	n]

ATC Probe is connected with Meter, right display is displayed directly.

And user is able to put temp manually also. If there are quite difference between temp in the Meter and Real Temp, user set correct time by the direction appeared the bottom of screen.

### Setting Common in Setup

From this <Setup>, move to <Common> mode by pressing **Move key**. After pressing **Enter Key**, then below is displayed.

Setup Cal	Memory	Help	Item			
Common						
Time	R	5232				
Time	RS BS	232				
Message	05/0	8/24 1	5:00:32			
* Move : [Move], Select : [Enter] * Save & Exit : [Out]						

Setup	Cal	Me	mory	Help	ltem
Commo	n				
Time					
05	/ 08	8 7	24	15 : (	)0
Message 05/08/24 15:00:33			5:00:32		
* Value setting : [Up] / [Down] * Save & Exit : [Memory]					

S	etup	Cal	Me	mory	Help	Item	
C	Common						
	RS232						
Interval 📑							
	Min	5	Sec	— Г			
	00		00	(	OM		
Message 05/08/24 15:00:3					5:00:32		
* *	* Value Setting : [Up] [Down] * Save & Exit : [Memory]						

By itemize, it is available to input or change a value following as the message

(1) Time: Available to change <temp> and <date>, which is displayed on the LCD

(2) RS232: Available to input or change a time Interval of <Data-Logging>.





### 3.1.2 Calibration in DO Mode

Salinity, Altitude and temp are the factor what is influence to dissolved oxygen. So, user can set this factor in Setup mode and after setting, the values are displayed at bottom of LCD.
Because of using polarographic Electrode, after power on and user should wait for 20 min for stabilizing.

\* Rinse DO sensor with distilled water carefully and remove moisture and put it in the air.

#### Preparation

Connect DO sensor and ATC probe with Meter (Back side) Clearly rinse probe with distilled water and blot dry with tissue. Prepare solution for calibrating and magnetic stirrer. It takes 20 minutes to polarize probe because of using polarographic sensor.

User stirs solution by using magnetic stirrer constantly.

DO sensor should be kept saturate solution with oxygen by the bubbling equipment at least  $1\sim 2$  hours for accurate calibration.

#### Zero Calibration

#### There are two ways of **Zero calibration**.

User can enter cal Mode by using **Move Key**. And press **Enter key**.

1) In case of calibration with solution not containing DO, add excess sodium sulfite,  $Na_2SO_3$ , and a trace of cobalt chloride,  $CoCl_2$ , to bring DO to zero. Put probe into this solution.

2) In case of calibration without solution, remove probe from Input and press **Measure Key**. If the reading is stable, press **Cal Key**, and then Cal-OK message is displayed in the upper field and set automatically.

Put saturated solution into BOD bottle and cap to minimize the exposure in the air.

In initial DO display, press Move Key to change to Cal and press Enter Key.



Put probe into a zero solution and press **Measure Key**. If data stables, press **Memory/Out Key** to finish calibration using zero solution.





After calibration, the following display will be shown and it automatically changes into second calibration; saturated calibration. Put probe into a saturated solution and press **Measure Key**. If data stables, press **Memory/Out Key** to finish calibration.

Setup Cal M DO	lemory Help Item	Setup Cal M DO	lemory Help Item	Setup Cal DO	Memory Help Item	
0.00 mg/L		7.98 mg/L		8.33 mg/L		
	ATC 25.0'C		ATC 25.0'C		ATC 25.0'C	
Message	05/08/24 15:00:32	Message	05/08/24 15:00:32	Message	05/08/24 15:00:32	
*Zero calibration is completed.		* For finish of ca	alibraion:[Memory]	* Complete sa	turate solution.	

After finishing calibration, it automatically moves to DO initial display and calibrated date and method will be shown at the screen.

#### Memorizing in DO Mode. 3.1.3

While measuring DO, press Memory/Out Key and data will be stocked with a following display. Searching for stored data, press **Move Key** in DO initial display to move to Memory. Press Enter Key and moves to stocked data mode.



It is indicated <Measuring date>, <Time> and <Saved data> besides this, user can search a former date which was saved. If user would like to clear whole memories, press Memory/out Key to move Memory Clear Display After memory clear, whole data and selected values in Setup Mode will be deleted completely. In case of the instrument can't sense a connected electrode or wrong time settled or wrong data memories are saved, User can try < Memory Clear>.





### 3.1.4 Help in DO mode

From DO initial display, press Move Key to move Help Mode

	Help –			Help –
English	Korea	PH EC Me Se	Calibration Calibration emory Clear nsor	O2 Calibration ION Calibration Key A/S

User can select proper language by using **Move Key**, and press **Enter Key** to see the Help Manu in detail.

#### 3.1.5 Measuring $pO_2$ .

While measuring DO, press **Mode Key** for changing  $pO_2$  and DO alternately. Following display is for  $pO_2$ .

Setup	Cal	Memory	Help			
pO <sub>2</sub>						
0.0 mmHg						
	ATC 25.0'C					
Message	Message 05/08/24 15:00:32					
* In process of measuring.						





### 3.2 Setting O<sub>2</sub>

### 3.2.1 Setup in $O_2$ Mode

From the Initial display, select  $O_2$  Item by pressing **Move Key**. After selecting  $O_2$  and press **Memory/Out Key**, then below (right one) is displayed.



From the display, move to Setup by using **Move Key**. Each single item can be selected by pressing **Enter Key**.

#### Setting Altitude in setup menu

In O<sub>2</sub> Setup, press **Enter Key** and the following display will be shown.

Setup	Cal	Memory	Help	
Altitude				
		0 me	eter	
Message 05/08/24 15:00:32				
* Value setting : [Up] / [Down] * Save & Exit : [Memory]				

You can change altitude by pressing **Up/Down Key** 50m per a hit.

#### Setting Temp menu in Setup.

In  $O_2$  DO Setup display, press **Move Key** to move to Temp and press **Enter Key.** The following screen will be shown.

Setup Cal	Memory Help						
Channel 1							
ch1 ch2 ch3 Rear View							
Connect Temp. Sensor							
Message 05/08/24 15:00:32							
* Move : [Move], Select : [Enter] * Save & Exit : [Out]							

Setup	Cal	Memory	Help				
Channel 1							
25.0 'C							
Messag	е	05/08/24	15:00:32				
* Value setting : [Up] / [Down] * Save & Exit : [Memory]							
	1						



If the ATC probe is disconnected with the meter, left display with direction "Connect Temp Sensor "is shown. And the ATC is connected with it, you can go to right display directly. And user is able to put temp manually. If there are quite difference between temp in the Meter and Real Temp, you can set correct time by the direction appear the bottom of screen.

### Setting Common in Setup menu

In  $O_2$  Setup display, press **Move Key** to move to Common and press **Enter Key.** The following screen will be shown.



By itemize, it is available to input or change a value following as the message from the bottom of LCD. You may refer to DO setup for the details.

### 3.2.2 Calibration in O<sub>2</sub> Mode

In  $O_2$  initial display, press **Move Key** to move to Cal and press **Enter Key**. Then you can see the following display.

Setup Cal	Memory	Help	Setup	Cal	Memory	Help	Setup	Cal	Memory	Help
O <sub>2</sub>			02				02			
(	).0 %		20.1 %				20	).9 »		
	ATC 2	5.0'C			ATC 2	5.0'C			ATC 2	5.0'C
Message	05/08/24	15:00:32	Messag	е	05/08/24	15:00:32	Messag	е	05/08/24	15:00:32
* For starting of calibration:[Measure] * Exit:[Out]		* For finish of calibration : [Memory]		* Complete saturated.						

If the data stables, press Memory/Out Key to finish calibration.

After finishing calibration, it automatically moves to  $O_2$  initial display and calibrated date and method will be shown at the screen.





### 3.2.3 Memorizing in O<sub>2</sub> Mode

While measuring O<sub>2</sub>, press **Memory/Out Key** and measuring data will be stocked.

Setup Cal	Memory Help	Setu	) Cal	Memory	Help	Setup	Cal	Memory	Help
02				Numbe	er [001]	Clear			
20.8 %			Date & Time : 05/08/24 15:00 O <sub>2</sub> 20.4% Temp 25.0'C			YE	S	Ν	0
					16	KByte	e Memory	/	
Message	05/08/24 15:00:32	Mess	age	05/08/24	15:00:32	Messag	e	05/08/24	15:00:32
* Measured data is saved.		+ Num + Exit	* Number change : [Up] / [Down] * Exit : [Out]			* Value * Select	setting ::[Ent	:[Up]/[Dow er]	'n]

If you would like to find the measuring data which you've saved, in the initial display of  $O_2$ , move to Memory by pressing Move Key twice. And press **Enter Key** to move memories. You may refer to [DO setup] part for the details.

### 3.2.4 Help in $O_2$ Mode.

From initial display of  $O_2$ , press **Move Key** three times to move <Help>. After that, press **Enter Key** then, a display is shown as the DO Mode.





### 3.3 Setting AIR

### 3.3.1 Setup in AIR Mode.

From the Initial display, select Air Item by pressing **Move Key**. After selecting Air and press Memory/Out Key, then below (right one) is displayed.





From the display, move to <Setup> by using **Move Key**. Each single item can be selected by pressing **Enter Key**. You may refer to DO setup for the details.

#### Setting Altitude in Setup menu.

In AIR Setup, press **Enter Key** and following display will be shown. Yu can change altitude by pressing **Up/Down Key** 50m per a hit.

#### Setting Temp in setup menu.

From this Setup, move to Temp mode by pressing **Move Key**. After pressing **Enter Key**, then below is displayed.

Setup	Cal	Memory Hel				
Channe	11					
ch1	ch2 d	h3 <mark>Rear \</mark>	/iew			
۲	$\odot \circ 0$	)• 📼				
Connect Temp. Sensor						
Message		05/08/24	05/08/24 15:00:32			
* Move : [Move], Select : [Enter] * Save & Exit : [Out]						

Setup	Cal	Memory	Help		
Channe	1				
25.0 'C					
Message 05/08/24 15:00:3					
* Value setting : [Up] / [Down] * Save & Exit : [Memory]					





If the ATC probe is disconnected with the meter, left display with direction "Connect Temp Sensor "is shown. And the ATC is connected with it, you can go to right display directly. And user is able to put temp manually. If there are quite difference between temp in the Meter and Real Temp, you can set correct time by the direction appear the bottom of screen.

#### Setting Common in Setup menu.

From this <Setup>, move to <Common> mode by pressing **Move key**. After pressing **Enter Key**, then below is displayed.

Setup Cal Me	emory Help Item	Setup	Cal	Memory	Help	Setup	Cal	Memory	Help
Common		Commo	n			Comm	on		
Time	RS232	Time				RS23	2		
Time	<b>FS232</b>	05 /	′08/	24 15 :	00	Int Min 00	erval Sec 00	Сом	
Message	05/08/24 15:00:32	Messag	е	05/08/24	15:00:32	Messag	е	05/08/24 1	15:00:32
* Move:[Move], Select:[Enter] * Save & Exit:[Out]		* Value : * Save &	* Value setting : [Up] / [Down] * Save & Exit : [Memory]			<ul> <li>Value Setting : [Up] [Down]</li> <li>Save &amp; Exit : [Memory]</li> </ul>			

By itemize, it is available to input or change a value following as the message from the bottom of LCD. You may refer to DO setup for the details.

### 3.3.2 Calibration in AIR Mode.

From the Initial display, select Air Item by pressing **Move Key**. After selecting Air and press **Cal Key**, then below is displayed

Setup Cal	Memory Help	Setup Cal	Memory	Help	Setup	Cal	Memory Hel	lp
AIR		AIR			AIR			
0.0 % 98.8 %				1	00 %			
	ATC 25.0'C		ATC 25	5.0'C			ATC 25.0'C	
Message	05/08/24 15:00:32	Message	05/08/24 1	5:00:32	Messag	e	05/08/24 15:00	:32
* For starting of calibration : [Measure] * Exit : [Out]		* For finish of calibration : [Memory]		emory]	* Comple	te satur	ated.	

If the data stables, press **Memory/Out Key** and finish setup.

After finishing calibration, it automatically moves to Air initial display and calibrated date and method will be shown at the screen.



### 3.3.3 Memory in AIR Mode.

While measuring Air, press Memory/Out Key for saving the data.



If you would like to find the measuring data which you've saved, in the initial display of  $O_2$ , move to <Memory> by pressing Move Key twice. And press **Enter Key** to move memories

It is available to be indicated measured data, time and saved-data. Beside this, you also can search the former dates which were saved by using **Up/Down Key**. And if you would like to <Memory Clear>, press **Memory/out Key** to move Memory Clear Display. **After memory clear, whole data and selected values in Setup will be deleted completely**. In case of the instrument can't sense a connected electrode or wrong time settled or wrong data memories are saved, you can try <Memory Clear>



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# Chapter IV. Data-Logging

#### 4.1 Data-logging in Memory

The measured data is stored by pressing **Memory Key** manually. If user would like to print the data which is stored in meter, search data stored in instrument by using **Up/down Key**.

<Data -log in DO Mode>

Setup	Cal	Memo	гy	Help	
		Nur	nber	[001]	
Date & Time : 05/08/24 15:00 DO 7.89mg/L Temp 25.0'C					
Messag	05/08/	24 1	5:00:32		
* Number change : [Up] / [Down] * Exit : [Out]					

#### 4.2 Data-Logging to Printer & Computer

From each Mode, press [Setup Menu] -> [Common Menu] -> [RS232 Menu] And below is displayed.

Se	tup	Cal	Memory Help	
Со	mmor	ı		
R	5232			
Interval Min Sec 00 00		rval Sec 00	FINT Print	
Message			05/08/24 15:00:32	
* Value setting : [Up]/ [Down] * Save & Exit : [Memory]				

By using **Move Key**, user can move to section of Interval and select 'Printer' or 'Com(PC)'. When user selected each condition, then the date will be printed at the appointed intervals. Also it is printed whenever user press **Print Key** regardless of setting conditions.

When user wants to receive the data with regular interval in computer, there are 2 different ways. At first, user gets it via Hyper Terminal at the appointed intervals. Second is via SDIS software which is provided by istek, Inc. (Optional), user can receive and edit the data in MS Excel program easily. And also make a relative graph with the data or other many functions it has.



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### Chapter V. Troubleshooting & Error Description

MALFUNCTION	POSSIBLE CAUSE	REMEDY
		Press Power key.
	No power to meter	Check that battery is inserted correctly and polarity signs match.
Out of range reading or unstable reading	Probe failure	Clearly rinse electrode and blot dry.
		If air bubble is Occurred on membrane, remove air bubble.
		Check membrane for damage(i.e. holes and leak, etc.) If membrane gets damage, replace Membrane.

If the cause is uncertain, clear memory (data) to eliminate all data. Refer to Clear Memory (data) of Setup Functions.

- \* When using Ion Selective Electrodes, refer to ISE manual.
- If the problem persists, please contact istek, Inc Product Service Department. (Tel : 82-2-2108-8400, E-mail : <u>istek@istek.co.kr</u>)





# Chapter VI. Specifications

Model		DO-350L		
DO	Range Resolution Relative Accuracy	0.00 to 19.99 mg/L 0.01/0.1 ±0.5%		
02	Range Resolution Relative Accuracy	0.0 to 60.0% 0.1% ±1 digit		
Air Saturation (%)	Range Resolution Relative Accuracy	0.0 to 1999.9% 0.1% ±1 digit		
Temperature	Range Resolution Relative Accuracy	-10 to 60℃ 0.1℃ ±0.4℃		
Salinity Correction		0 to 70ppt		
Altitud	e Correction	0 to 4000m		
Data	a-Logging	500 Point		
Temperatur	re Compensation	Auto		
Cal	ibration	Auto		
Input		One BNC, One ATC, Power, RS232C		
Output		RS232C (Computer/Printer)		
Power		Adaptor		





# Chapter VII. Ordering Information

\* Other items contact istek.

For further information on other accessories, please feel free to contact istek at any time.

### A. Standard

- \* DO Polarographic Electrode (ATC included)
- \* DO Membrane and inner filling soution.
- \* AC/DC Power Adaptor
- \* Instruction Manual

#### B. Option

- \* Interior printer module.
- \* Luxury Third-Arm Stand
- \* DO Membrane Kit.
- \* BOD Adapter
- \* RS232C Interface Cable
- \* SDIS Program

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#### CERTIFICATE OF WARRANTY

- \* We guarantee as following,
- 1. This product has been passed our strict inspection process. (It comes under the meters with the exception of an electrode)
- 2. Defects occurring within 2years from delivery date shall be remedied free of charge at our works when it has been used in a normal situation. (But we can make a user pay for mending charge in the case of trouble caused by a careless user.)
- 3. We will repair the good with fee about problems caused by user's mistake even if warranty period has not been over.
- 4. Please present this form with the good when you want to repair it.
- 5. Please keep this certificate with care because this sheet will not be reissued.

Product name	Warranty period
Model name	
Serial number	
Manufacturing	2 years
month/year	

Date. . , 20 Authorized signature



