Laboratory Equipment Manufacturer
www.mrclab.com

User Manual

Electronic Titrator

BDI-TIT

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION

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MRC.3.17

Content

Safety Reminder

⚠ **CAUTION：** Possible damage to instrument. Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the instrument.

1. Unpacking

Apart from the user manual, the BDI-TIT package should contain the following items.

Electronic Titrator Include:

- Titrating pipe X1
- Titrating pipe cover X1
- BDI-TIT X1
- AC Adapter X 1
- Controller X 1
- Controller cable USB X 2
- Bottle Adapter X 5(GL32; GL38; GL28; GL25; S40)
- Magnetic Stirrer X 1
- Remote Titrating pipe X 1
- Remote Control Handle X 1
- Stirrer Bar (20mm) X 1
- Filling valve X 1
- Dispensing valve X 1
- Filling pipe X 2
- Installation tools X 1
- Stander

Please check that all the items are present and inform your supplier immediately if any of the above is missing.

2. Overview

A digital titrating instrument, BDI-TIT delivers accurate and precise bottle-top titration.
Please refer to "Limitations and Compatibility" for liquid compatibility prior to operation.

2.1 Specification

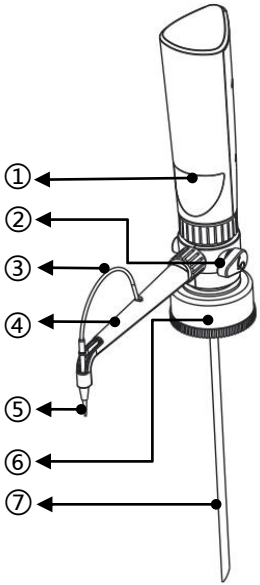
Volume Range	0.01mL-99.99mL Increment 10μL
Precision	R= 0.2% CV=0.07%
Velocity	16 Stages
Battery	Capacity：4000mA/h Fully charged in 4 hours (please use standard charger) working time：about 5 hours

2.2 Limitations of Use

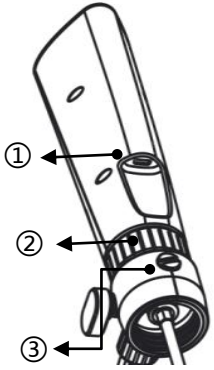
- Temperature：15 ~ 40°C
- Vapor pressure：<500mbar
- Viscosity：<500mm²/s
- Humidity：20~90%

3. Parts Description

3.1 BDI-TIT

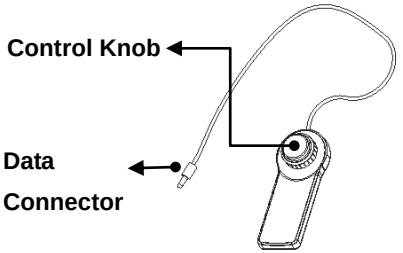


No.	Description
①	**Liquid Level Observation** (in piston running state)
②	**Return Valve** (to adjust the liquid direction of dispensing)
③	**Titrating pipe**
④	**Titrating pipe cover**
⑤	**Titrating pipe Tip**
⑥	**Bottle Adapter**
⑦	**Filling pipe**



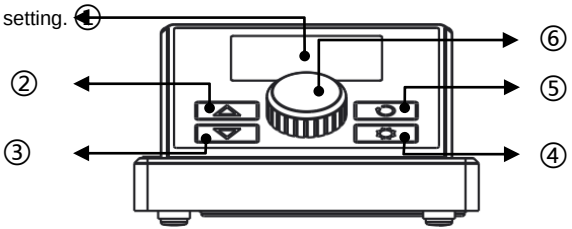
No.	Description
①	**Controller Port** (Micro USB)
②	**Main Body lock**
③	**Air Admission Cap** (pressure balance)

3.2 Remote Control Handle

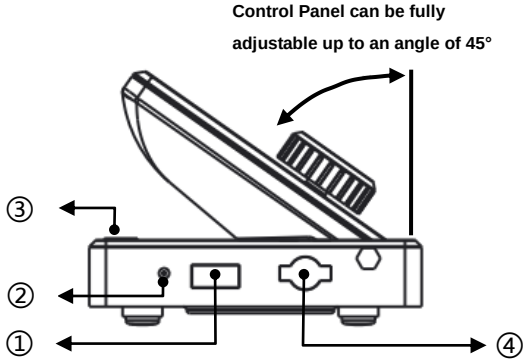


3.3 Controller

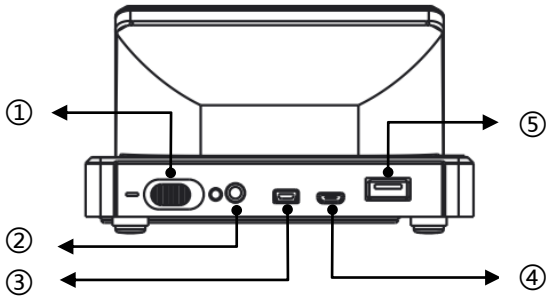
Allows for BDI-TIT control and function setting.



No.	Description
①	**LCD Display** (show BDI-TIT running state)
②	**Filling** (press and hold for filling , release it to stop)
③	**Dispensing** (press and hold for fast titration , release it to stop)
④	**Setting/magnetic stirrer** (short press switching magnetic stirrer on/off; press and hold 2s into setting interface)
⑤	**Pre-Filling** (press and hold 2s for piston to complete a aspirating and dispensing process)
⑥	**Knob** (Turn Knob for dropwise titrating, short press Knob for reset the liquid volume record to zero)

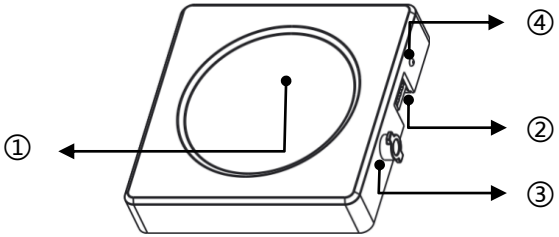


No.	Description
1	**Magnetic Stirrer Data Port** (USB)
2	**Locating Slot** (to ensure magnetic stirrer assembly in place)
3	**Sensor Holder Assembly Slot**
4	**Magnetic Stirrer Fastening Slot** (to fixation with controller)



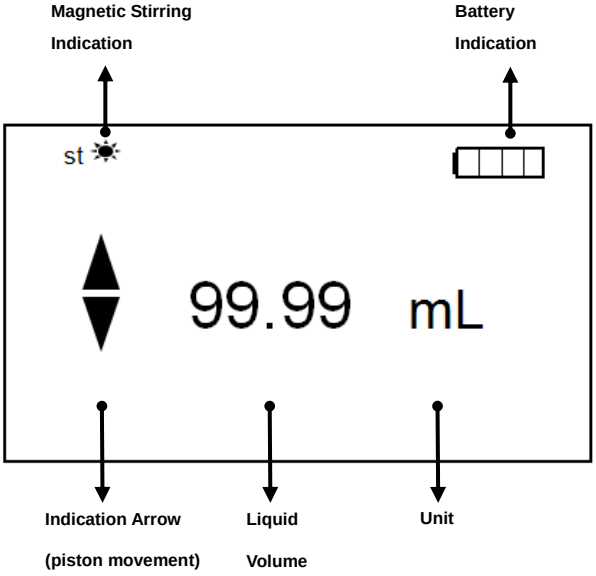
No.	Description
1	**Power Switch** (symbol “O”indicates Off , ”-” indicates On)
2	**Remote control handle Port**
3	**Communication port** (non-function)
4	**Charging/Communication port**
5	**Main Instrument Port**

3.4 Magnetic Stirrer



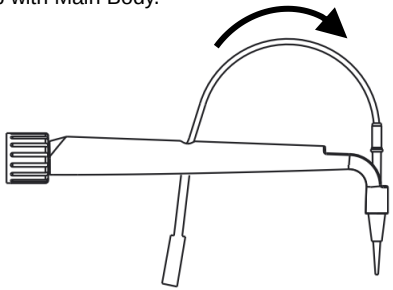
No.	Description
1	**Stirring Plate** (Max. Bar 20mm)
2	**Communication port**
3	**Fastening key**
4	**Location key** (to ensure magnetic stirrer assembly in place)

3.5 Display

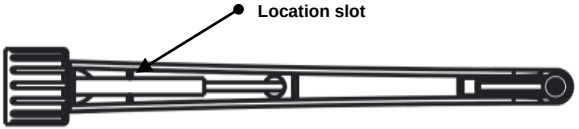

Magnetic Stirring
Indication
Battery
Indication
st
99.99
mL
Indication Arrow
(piston movement)
Liquid
Volume
Unit

4. Assembly Instruction

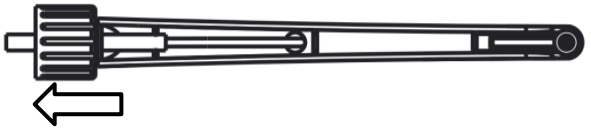
Step - 1: Turn the Main Instrument Lock clockwise to connect titrating tip with Main Body.



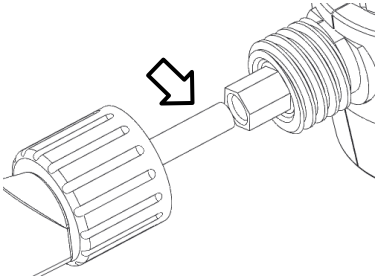
Step - 2: Press the titrating pipe tail end into the location slot.



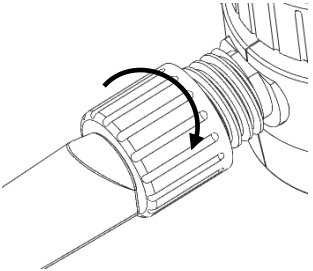
Step - 3: Push the titration pipe tail end with a certain length.



Step - 4: Connect the titration pipe tail end with the Dispensing valve.

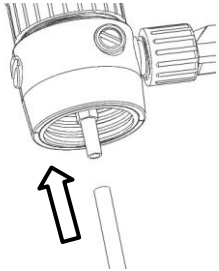


Step - 5: locking the titration pipe.

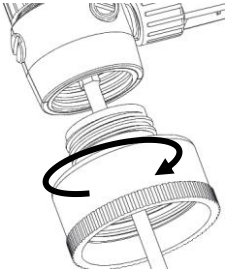


⚠ **CAUTION：** Titrating pipe are made of FEP. Please confirm compatibility prior to use(Refer to chapter12 “Limitations and Compatibility”).

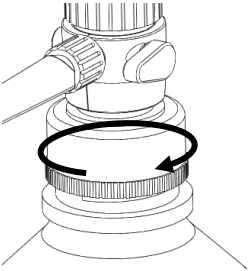
Step - 6: Connect filling pipe with filling valve.



Step - 7: Choose a suitable bottle adapter, then connect it with BDI-TIT main body.



Step - 8: Turn bottle adapter to fasten main body and bottle.

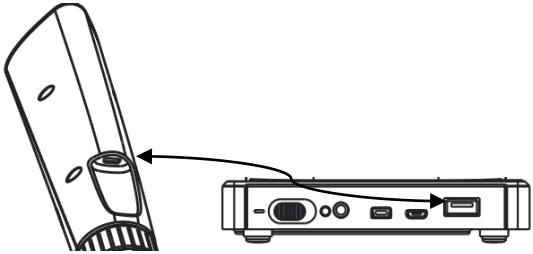


⚠ CAUTION：

① Please enable that the adapter is fastened prior to each use.

② For perfect titration, please do not move or touch Main Instrument during operation to avoid physical damage to your BDI-TIT.

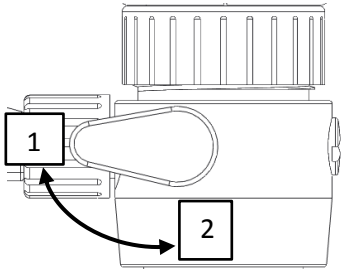
Step - 9: Use USB cable to connect Main Instrument with Controller.



Step - 10: Turn Return Valve to direction ①

If liquid is needed to be emptied from the barrel, turn Return Valve to direction ②.

BDI-TIT basic system was assembled.



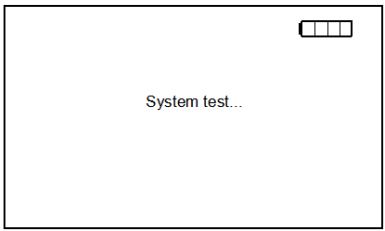
5. Operation

⚠ **CAUTION: Do a complete process of aspirating and dispensing before the first time work.**

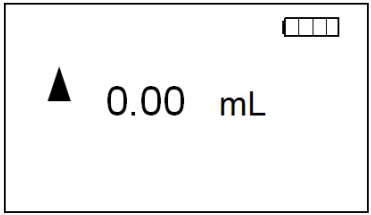
5.1 Titration

Step - 1: Power on.

Step - 2: Waiting self-check complete.

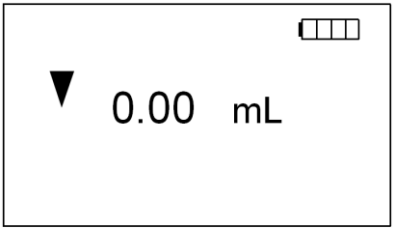


Step - 3: Long press **Pre-filling button** ( ) 2 seconds to let air out, leaving the piston at the bottom of the barrel finally.



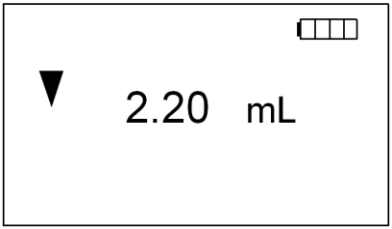
Step - 4: Press and hold **Filling button** ( ) to fill targeted liquid until Indication Arrow showing that the piston is moving downward.

Long press knob 2 seconds, do the same operation also.



Step - 5: Long press **Dispensing button** (▽)for fast titration. Turn Knob for dropwise titrating.

The **dispensing liquid volume** will been continue recording and the volume will be show on the screen.



NOTE :

When recorded volume reaches the maximum value of 99.99ml, the instrument will stop.Please press the **knob** to reset Liquid Volume to zero.

⚠ **CAUTION: There will may be some air bubble in the barrel during the operation. These bubble dose not effect the actual use.**

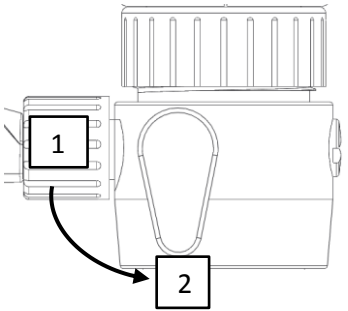
If the bubble is bigger to effect the actual use, please

running several times aspirating and dispensing. If this solution not works, please contact with the dealer or manufacturer.

5.2 Liquid Emptying

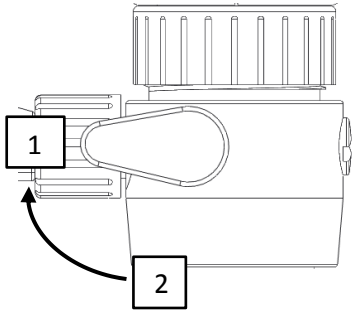
If liquid is needed to be emptied from the barrel.

Step - 1: Turn Return Valve to direction ②.



Step - 2: Long press **Dispensing button** (▽) ,until the piston run to the bottom of the barrel, make the liquid had been emptying.

Step - 3: Turn Return Valve to direction ①.
Emptying operation was completed.



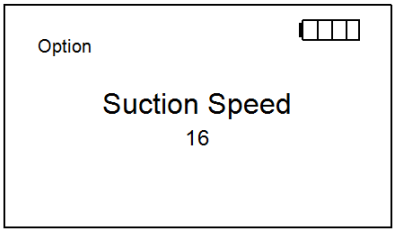
6. Function Setting

Press **Setting button**( )for about 2 seconds to enter Function Setting interface.

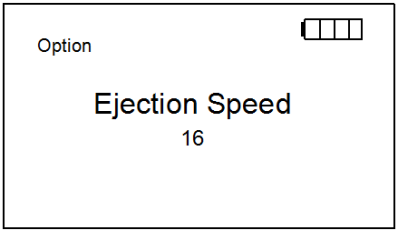
Press **Setting button**( )to flick through pages.

Long press **Setting button**( )for about 2 seconds on any page to exit Function Setting interface.

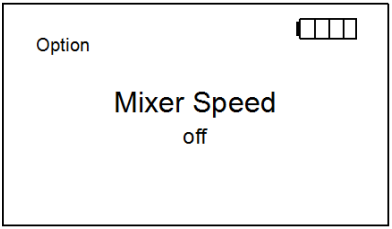
Page I: Aspiration speed within a range of 1-16. Turn **Knob** to adjust and press for confirmation.



Page II: Dispensing speed within a range of 1-16. Turn **Knob** to adjust and press for confirmation.



Page III: Magnetic stirrer speed within a range of off-5. Turn **Knob** to adjust and press for confirmation.



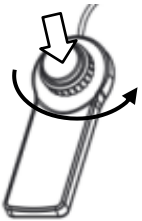
NOTE: This function is effective after connecting the magnetic stirrer only.

7. Accessories

7.1 Remote Control Handle

The Control Handle is fully map the operation of Control Panel, easy to operate over a long distance.

Turn Knob for dropwise titrating, short press for reset liquid volume record to zero, long press 2 second for filling liquid.

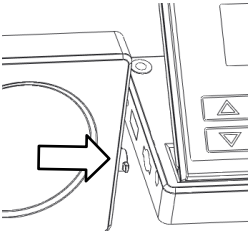


MAX. Length：90 cm

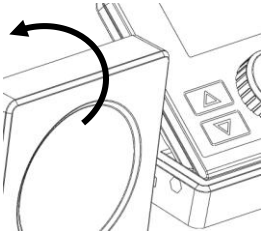
7.2 Magnetic Stirrer

Magnetic stirrer convenient user for mixing during the titration experiments.

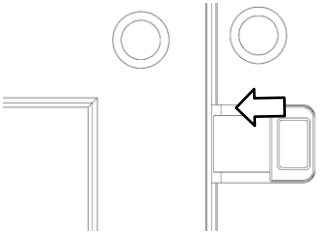
Step - 1: Connect Control Panel Fastening Slot with Magnetic Stirrer Fastening Slot.



Step - 2: Turn the Magnetic Stirrer into horizontal position until the Location Hole into the Location Slot.

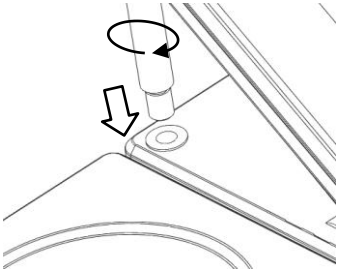


Step - 3: Connect the USB Port under the Magnetic Stirrer with the Control Panel.

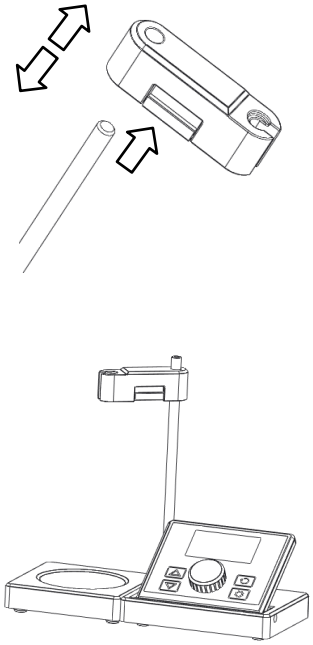


7.3 Assemble Sensor Holder.

Step - 1: Fasten the Holder into place.



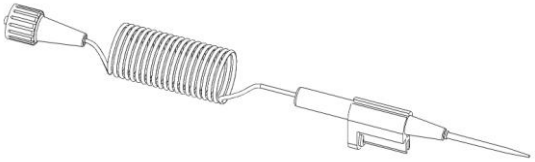
Step - 2: Press black button of the clamp and release until reaching the appropriate altitude.



Assembly diagram

7.4 Remote Titrating pipe

Remote titrating pipe can effectively extend the titration distance.

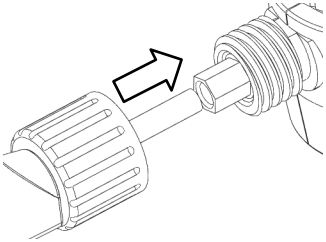


MAX. Length 1.5m

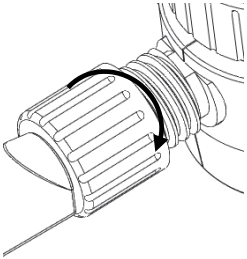
⚠ **CAUTION:**

Titrating pipe are made of FEP. Please confirm compatibility prior to use(Refer to chapter12“Limitations andCompatibility”).

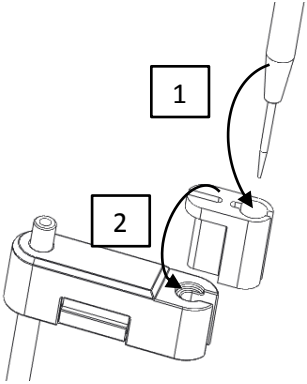
Step - 1: Connect the titration pipe tail end with the Dispensing valve.



Step - 2: locking the titration pipe.



Step - 3: Follow the figure to assemble the adapter and remote titrating pipe.



8. Calibration

Calibration should take place at 20-25℃, kept constant within

±0.5℃. A dedicated calibration software will write calibration values in your BDI-TIT, after the distilled water has been repeatedly weighed up at least five times.

Hardware needed: :

●Electronic balance with readability of 0.01 mg

●Distilled water

●X86-or X64-architectured PC with pre-loaded Windows (XP/Vista / 7/8/10)operating system

Software needed:

● Dedicated calibration software of BDI-TIT

(For more information, please contact with your nearest distributor.)

⚠ **CAUTION:**

If your BDI-TIT can not work properly after calibration, please contact your nearest distributor for assistance.

9. Cleaning and Maintenance

⚠ **CAUTION: BDI-TIT cannot be autoclaved.**

9.1 Cleaning the Outer Surface

The outer surface of your BDI-TIT is made of ABS, ideal for easy cleaning with simply clean water.

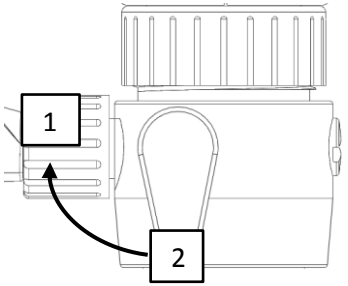
9.2 Cleaning the Barrel

BDI-TIT barrel cleaning is repeatedly inhale row clear water for cleaning.

Aspiration and dispensing at least 5 times, according to user's actual situation to increase or decrease.

To ensure emptying remained in the barrel, the operation reference "liquid emptying"

Step - 1: Turn Return Valve to direction①, long press **Pre-filling** button make the piston stop at the barrel bottom



Step - 2: Press **Filling** and **Dispensing** button to aspiration and dispensing simply clean water at least 5 times.

Step - 3: long press **Pre-filling** button make the piston stop at the barrel bottom.

Step - 4: Ensure that into the tube is not submerged in a liquid, Press filling button make piston run to the top of the barrel.

Step - 5: Turn Return Valve to direction②, press Dispensing button make piston run to the bottom of the barrel.

Step - 6: Cleaning work is finish,Turn Return Valve to direction①

⚠ **CAUTION:** User is not recommended to remove and

cleaning of BDI-TIT barrel, if the barrel cleaning operation fail to meet the cleaning requirements of users. please contact the dealer or manufacturer professional services personnel for cleaning.

Ensure BDI-TIT empty without liquid residue before delivery to service personnel and inform details of last liquid handling.

9.3 Filling and Dispensing valve Replacement

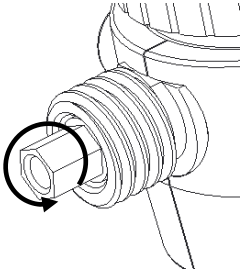
Use the Installation tools to disassemble the old valve, replace the

new valve to the same position.
Valve has no fixed replacement cycle, problems after the replacement.
The issue that could be has involvement with valve, please checking the “Trouble Shooting”

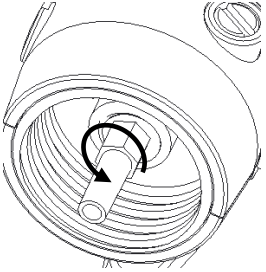
⚠ **CAUTION: The following operation must to use installing tools to do.**

Before disassemble, ensure to remove the dispensing and filling pipe.

Disassemble Dispensing valve



Disassemble Filling valve



10. Trouble Shooting

Issue	Possible Cause	Solution

Piston overflows with liquid	Piston wears out.	Contact with manufacturer
Piston moves with difficulty	Piston or its parts are contaminated or damaged due to crystallization and sedimentation.	① Do “Cleaning the Barrel” ② Contact with manufacturer
Failure to filling	Filling valve is clogged.	① Replace filling valve ② Contact with manufacturer
Failure to refill; refilling sucks back into the titration tip.	Dispensing valve is contaminated or titration tip damaged.	
Bubbles in the instrument/ Dispensing volume is less than the volume displayed.	Filling pipe is loose or damaged.	Replace filling pipe
	Filling pipe is away from the liquid.	Chicking filling pipe
	Return pipe is not installed or wrongly	Contact with manufacturer

	installed.	
	The instrument is not fully refilled.	Checking Operation
	Filling valve is clogged or damaged.	Checking filling valve
		Replace filling valve
No display	Battery dead	charging
	Connection fail	USB cable connection checking

11. Storage

During storage periods at constant temperature and humidity,

the recommended temperature range is from 0-40℃ and humidity no more than 80%.

Please every month to charging for BDI-TIT if being unused in long time , make sure there are 50% power in battery at least.

12. Warranty

BDI-TIT electronic titrators are covered by one-year warranty against defects in workmanship and materials. Please contact us or your nearest distributor.

ANY WARRANTY WILL, HOWEVER, BE DEEMED AS VOID WITH NORMAL WEAR AND TEAR OR FOR OPERATIONS CONTRARY TO THE INSTRUCTIONS GIVEN IN THIS MANUAL.

Each and every BDI-TIT has been calibrated and tested in compliance with ISO8655-6 / DIN12650 when manufactured, ensuring safe and comfortable operation.

13. Limitations and Compatibility

It is recommended to confirm reagent's compatibility with this

instrument when applied for special purposes, trace analysis for example.

–The liquid-path construction of your BDI-TIT is made of borosilicate glass, FEP and PTFE. Do not apply it in handling liquids like hydrofluoric acid.
– The instrument would be clogged or damaged by solid particles in turbid liquid like activated carbon.
– The plastic parts of your BDI-TIT would be in swelling condition if concentrated acid and alkaline, and methylbenzene, benzene and other nonpolar organic solvents are put into use.
– Keep your BDI away from the highly combustible carbon disulfide.
– BDI-TIT cannot be autoclaved.
– Do not put your BDI-TIT in contact with corrosive gas like HCL smog.

Compatibility (Max. Conc. 1 mol/L)

Acetic acid

Alcoholic potassium hydroxide solution
Ammonium iron (II) sulfate solution
Ammonium thiocyanate solution
Barium chloride solution
Bromide bromate solution
Cerium (IV) sulfate solution
EDTA solution
Hydrochloric acid
Hydrochloric acid in Acetone
Iodine solution*
Iodide Iodate solution*
Iron (II) sulfate solution
Nitric acid
Oxalic acid solution
Perchloric acid
Perchloric acid in glacial acetic acid

Potassium bromate solution
Potassium bromate bromide solution
Potassium dichromate solution
Potassium hydroxide solution
Potassium iodate solution
Potassium permanganate solution*
Potassium thiocyanate solution
Silver nitrate solution*
Sodium arsenite solution
Sodium carbonate solution
Sodium chloride solution
Sodium hydroxide solution
Sodium nitrite solution
Sodium thiosulfate solution
Sulfuric acid
Tetra-n-butylammonium hydroxide sol.

Triethanolamine in Acetone*
Zinc sulfate solution

⚠ **CAUTION:** This compatibility is against parts which are directly in contact with liquid, if any of above solution needs to be applied, contact with manufacturer for consultation.