Eco Titrator

Product information

8.1008.8002EN / 2019-02-20
Eco Titrator

Product information
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1 Overview

1.1 Product description

The Eco Titrator is a titrator for volumetric titrations for universal use that is equipped with the following functional units:

- Built-in magnetic stirrer
- Dosing unit with exchangeable cylinder unit

Methods can be created and saved on the instrument. The methods can be exported to and imported from a connected USB flash drive. This allows to copy methods from one instrument to another.

Dosing modes

The following titration modes and measuring modes are supported:

- DET
- MET
- SET
- CAL

Connectors

The instrument is equipped with the following connectors:

- USB 1 and USB 2
- Ethernet
- Remote
- 24 VDC Power OUT
- 24 VDC Power IN
- Ind
- Ref
- Temp
- Pol
1.2 Product versions

The product is available in the following versions:

Table 1 Product versions

<table>
<thead>
<tr>
<th>Art. no.</th>
<th>Designation</th>
<th>Version feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1008.0010</td>
<td>Eco Titrator</td>
<td>with magnetic stirrer</td>
</tr>
<tr>
<td>2.1008.1010</td>
<td>Eco Titrator Acid/Base</td>
<td>with magnetic stirrer</td>
</tr>
<tr>
<td>2.1008.2010</td>
<td>Eco Titrator Salt</td>
<td>with magnetic stirrer</td>
</tr>
<tr>
<td>2.1008.3010</td>
<td>Eco Titrator Oil</td>
<td>with magnetic stirrer</td>
</tr>
<tr>
<td>2.1008.4010</td>
<td>Eco Titrator Redox</td>
<td>with magnetic stirrer</td>
</tr>
</tbody>
</table>

The required numbers for the customer service can be found on the type plate (see example):

![Type plate example]

1 (01) = External article number
2 (21) = Serial number
3 (240) = Metrohm article number

NOTICE

Information on the accessories for the respective product version can be obtained either on the Internet at [http://www.metrohm.com](http://www.metrohm.com) or from your regional Metrohm representative.
### 1.3 Eco Titrator – Overview

**Figure 2  Eco Titrator – Front**

<table>
<thead>
<tr>
<th></th>
<th>Bottle holder</th>
<th></th>
<th>Space for cylinder unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bottle holder</td>
<td>2</td>
<td>Space for cylinder unit</td>
</tr>
<tr>
<td>3</td>
<td>Flat stopcock</td>
<td>4</td>
<td>Stand attachment</td>
</tr>
<tr>
<td>5</td>
<td>Magnetic stirrer</td>
<td>6</td>
<td>Status display, touch screen and control bar</td>
</tr>
</tbody>
</table>
### Figure 3  Eco Titrator – Rear

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type plate</td>
</tr>
<tr>
<td>2</td>
<td>USB connector (USB 1 and USB 2)</td>
</tr>
<tr>
<td>3</td>
<td>Ethernet connector (RJ-45)</td>
</tr>
<tr>
<td>4</td>
<td>Remote connector</td>
</tr>
<tr>
<td>5</td>
<td>&quot;Power OUT&quot; connector</td>
</tr>
<tr>
<td>6</td>
<td>&quot;Power IN&quot; connector</td>
</tr>
<tr>
<td>7</td>
<td>Pol connector</td>
</tr>
<tr>
<td>8</td>
<td>Temp connectors</td>
</tr>
<tr>
<td>9</td>
<td>Ref connector</td>
</tr>
<tr>
<td>10</td>
<td>Ind connector</td>
</tr>
</tbody>
</table>
Figure 4  Eco Titrator – Accessories

1  Cylinder unit
2  Tubing connections
3  Electrode cable
4  Electrode
5  Electrode holder
6  Guide sleeve
7  Clamping ring
8  Support rod
9  Buret tip
10 Amber glass bottle with GL 45 thread
11 Clip for SGJ 14/15
12 Bottle cap
13 Threaded stopper
14 Adsorber tube
Figure 5  Eco Titrator – Peripherals

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power supply unit</td>
</tr>
<tr>
<td>2</td>
<td>Ethernet cable (opt. accessory)</td>
</tr>
<tr>
<td>3</td>
<td>USB flash drive</td>
</tr>
<tr>
<td>4</td>
<td>Printer Q3X (opt. accessory)</td>
</tr>
</tbody>
</table>
1.4 Additional information

Additional information concerning the topic can be found:

- in the software help
- in the Metrohm information portal on the Internet https://guide.metrohm.com

1.4.1 Accessories

Up-to-date information on the scope of delivery and optional accessories for your product can be found on the Internet. You can download this information using the article number as follows:

**Downloading the accessories list**

1. Enter https://www.metrohm.com/ into your Internet browser.

2. Enter the article number of the product (e.g. 2.1001.0010) into the search field.
   
   The search result is displayed.

3. Click on the product.
   
   Detailed information regarding the product is shown on various tabs.

4. On the Included parts tab, click Download the PDF.
   
   The PDF file with the accessories data is created.

**NOTICE**

When you receive your new product, we recommend downloading the accessories list from the Internet, printing it out and keeping it for reference purposes.
2 Safety

2.1 Product safety

This product exhibited no flaws in terms of technical safety at the time it left the factory. To preserve this status and ensure non-hazardous operation of the product, the following instructions must be observed carefully.

2.2 Hazard levels

The following warning messages indicate the severity of the danger and its possible effects.

**DANGER**

*Immediate danger of life*
Irreversible injuries that will result in death.

 Warns of dangerous situations or unsafe actions that will most certainly cause severe injuries or death.

 Lists measures to avoid hazard.

**WARNING**

*Severe health hazards*
Serious injuries that could result in death.

 Warns of dangerous situations or unsafe actions that could result in serious injuries or death.

 Lists measures to avoid hazard.


2.3 Warning symbols

Make sure that any additional hazard symbols are marked on the product for your operation of the product.

The following warning symbols in the documentation and at hazard areas of the product point out hazard potentials:

- **CAUTION**
  - Warning of a hazard area

- **NOTICE**
  - Warning symbol on the product
  If this warning symbol is on the product, read the respective documentation prior to installation and initial start-up.

- Warning of electric shock from electrical potential
- Warning of danger of fire and explosion from highly flammable substances and gases
- Warning of danger of poisoning and chemical burns from chemical hazardous substances
- Warning of danger of infection and poisoning from biological hazardous substances
- Warning of risk of injury from high temperatures

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2.4 Intended use

Metrohm products are used for the analysis and handling of chemicals. Usage therefore requires the user to have basic knowledge and experience in handling chemicals. Knowledge regarding the application of fire prevention measures prescribed for laboratories is also mandatory. Adherence to this technical documentation and compliance with the maintenance specifications make up an important part of intended use. Any utilization in excess of or deviating from the intended use is regarded as misuse.

Specifications regarding the operating values and limit values of individual products are contained in the "Technical specifications" section, if relevant. Exceeding and/or not observing the mentioned limit values during operation puts people and components at risk. The manufacturer assumes no liability for damage due to non-observance of these limit values.

The EU declaration of conformity loses its validity if modifications are carried out on the products and/or the components.

2.5 Residual risks

2.5.1 General dangers at the workplace

Generally, the regulations and provisions of the regulatory institutions and authorities in the field of work apply. The instructions regarding the following areas have to be followed when using the products:

- Work safety
- Handling mechanical installations
- Handling electricity
- Handling hazardous and environmentally damaging substances
- Handling hazardous and environmentally damaging liquids
- Disposing hazardous and environmentally damaging substances

If they are not followed, this may result in:
- Disturbing, injuring and/or killing of people
- Malfunction and/or damage to instruments and infrastructure
- Damage and/or contamination of the environment

**WARNING**

**General dangers at workplace**

If the safety measures are not followed, working in a laboratory bears a high risk of injury, which can endanger your life and health.

- Only professionally trained and qualified specialist personnel may operate the products.
- Follow the applicable provisions concerning work safety and all regulations on wearing protective clothing.
- Use suitable tools to perform your work.
- Check the fill level of waste bottles or waste canisters and analysis vessels, and make sure they do not overflow.
- Use protective grounding when working with highly flammable substances and gases.

### 2.5.2 Danger from electrical potential

**WARNING**

**Electric shock from electrical potential**

Risk of injury by touching live components or through moisture on live parts.

- Never open the housing of the product.
- Protect live parts (e.g. power supply unit, power cord, connection sockets) against moisture.
- If you suspect that moisture has gotten into the product, disconnect the product from the energy supply. Then notify Metrohm Service.
- Only personnel who have been issued Metrohm qualification may perform service and repair work on electrical and electronic components.
2.5.3 **Danger from biological substances**

If the product is used for biological hazardous substances, it must be marked in accordance with regulations.

In case of a return shipment to Metrohm or a Metrohm Service partner, the product or product component has to be decontaminated and the hazard symbol for biological hazardous substances must be removed. A declaration of decontamination must be enclosed.

**WARNING**

Danger of infection and poisoning from biological hazardous substances

Poisoning from toxins and/or infections from samples contaminated with microorganisms.

- Clean and disinfect contaminated surfaces.
- Wear protective equipment.
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of biologically contaminated substances properly.

2.5.4 **Danger from highly flammable substances**

**WARNING**

Danger of fire and explosion from highly flammable substances and gases

Burns from fire and/or injuries from explosions.

- Avoid ignition sources.
- Use protective grounding.
- Use exhaust equipment.
2.5.5 Danger from careless transport

**WARNING**

Risk of injury from careless transport
Injuries from spilled chemical and/or biological substances, falling parts and pieces of broken glass.
- Remove loose parts (e.g. sample racks, sample beaker, bottles) before transport.
- Remove liquids.
- Lift and transport the instrument with both hands on the base plate.
- Lift and transport heavy instruments only according to instructions.

2.5.6 Danger from leakage

**WARNING**

Risk of injury by leakage
A risk of injury exists in connection with escaping liquids of leaking parts and/or connection elements.
- Replace leaking parts and connection elements without delay.
- Tighten loose connecting elements.
- Use environmentally-friendly methods to dispose of escaping liquids.

2.6 Responsibility of the operator

- Eliminate defects or damage which impair operating safety without delay.
- Eliminate malfunctions which could impair safety without delay.
- The rules, regulations and instructions listed in the present document are not the only valid ones. Comply with the applicable statutory rules, government agency directives and regulations.
- Unauthorized modification of the products excludes any and all liability on the part of the manufacturer for any damage resulting from this as well as for any consequential damage. No modifications, attachments or conversions which could impair safety may be carried out on the products without the approval of the manufacturer.
2.7 Personnel requirement

Only qualified personnel may operate the present product.

Qualified personnel are people authorized by the safety responsible to carry out the necessary operations. They are capable of recognizing and avoiding possible dangers. These people are qualified due to their professional training, experience and/or instruction. They know the relevant standards, laws, provisions, accident prevention regulations and the company conditions.
3 Technical specifications

3.1 Ambient conditions

Nominal function range  
+5 °C - +45 °C at a maximum of 85% humidity

Storage and transport  
–20 °C - +70 °C

3.2 Energy supply

External power supply unit

*Input*
- Nominal voltage range 100 - 240 VAC
- Frequency range 50 - 60 Hz
- Current max. 1.5 A

*Output*
- Nominal voltage 24 VDC
- Current max. 2.7 A
- Power output 65 W

Instrument

*Input*
- Nominal voltage 24 VDC
- Power consumption max. 20 W

*Output*
- Nominal voltage 24 VDC
- Power output max. 45 W

USB connector

*Nominal voltage* 5 V
### Dimensions

| Current at the power supply unit | 500 mA | max. output current per channel |

**Protection**

- Internal fuse: 1.5 A

### 3.3 Dimensions

#### Measurements

<table>
<thead>
<tr>
<th>Width</th>
<th>286 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td></td>
</tr>
<tr>
<td>Without cylinder unit</td>
<td>220 mm</td>
</tr>
<tr>
<td>With cylinder unit</td>
<td>358 mm</td>
</tr>
<tr>
<td>With support rod</td>
<td>508 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>286 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>3.6 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>without accessories and power supply unit</td>
<td></td>
</tr>
</tbody>
</table>

### 3.4 Housing

#### Materials

<table>
<thead>
<tr>
<th>Cover</th>
<th>PP</th>
<th>20% filled with talc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back panel</td>
<td>1.4301</td>
<td>stainless steel</td>
</tr>
<tr>
<td>Base</td>
<td>PP</td>
<td>20% filled with talc</td>
</tr>
<tr>
<td>Front foils</td>
<td>PET</td>
<td>EBA 180, anti-glare</td>
</tr>
</tbody>
</table>

| IP degree of protection | IP 40 |
### 3.5 Connectors specifications

#### Power IN
- **Socket**: round plug 4-pin

#### Power OUT
- **Socket**: round plug 4-pin

#### Remote
- **Socket**: D-Sub 9-pin

#### Ethernet
- **Type**: CAT 6
- **Socket**: RJ-45
- **Cable type**: min. FFTP, shielded
- **Cable length**: max. 10 m from Metrohm accessories

#### USB
- **Type**: 2.0
- **Socket**: type A
- **Cable type**: shielded
- **Cable length**: max. 5 m from Metrohm accessories

#### Measuring inputs
- **Ind**: Socket type F
- **Temp**: measuring input for potentiometric electrodes
### Display specifications

<table>
<thead>
<tr>
<th>Socket</th>
<th>2 × 2 mm</th>
<th>measuring input for temperature sensors of the Pt1000 or NTC type for automatic temperature compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pol</td>
<td>Socket</td>
<td>type F</td>
</tr>
<tr>
<td>Ref</td>
<td>Socket</td>
<td>4 mm</td>
</tr>
</tbody>
</table>

#### 3.6 Display specifications

**Display**
- **Type**: LCD
- **Size**: approx. 4.3” diagonal
- **Resolution**: 480 × 272 pixels
- **Status display**: LED green

#### 3.7 Operation specifications

**Touch panel**
- **Type**: Resistive

**Resistance to chemicals**
- Resistant to the following chemicals (no visible changes after 24 h of duration of action):
  - Ethanol
  - Methanol
  - Water

**Keys**
- 5 keys
3.8 Measurement specifications

**Potentiometric**

- **Measuring range**: $-2,000 - +2,000$ mV
- **Resolution**: 0.1 mV
- **Measuring accuracy**: $\pm 0.5$ mV
  - in the measuring range $-2,000$ mV to $+2,000$ mV

- **Input resistance**: $\geq 1 \cdot 10^{12}$ Ω
- **Offset current**: $\leq \pm 1 \cdot 10^{-12}$ A

**Temperature**

- **Pt1000**
  - **Measuring range**: $-150 - +250$ °C
  - **Measuring resolution**: 0.1 °C
  - **Measuring accuracy**: $\pm 0.4$ °C
  - in the measuring range $-20.0$ °C to $+150.0$ °C

- **NTC 30 kOhm**
  - **Measuring range**: $-5 - +250$ °C
  - **Measuring resolution**: 0.1 °C
  - **Measuring accuracy**: $\pm 0.6$ °C
  - in the measuring range $+10.0$ °C to $+40.0$ °C

**Polarizer**

- **Ipol DC**
  - **Polarization current**: 1, 20, 50, 100 µA
  - can be selected
  - **Measuring range**: 0 - 3,500 mV
  - **Measuring resolution**: 0.1 mV

**Reference conditions**

- **Instrument status**: min. 30 minutes in operation
- **Adjusting interval**: annual
Measuring accuracy applies to all measuring ranges without sensor error, under reference conditions, measuring interval 100 ms, room temperature +25 °C (± 3 °C), relative humidity ≤ 60%

3.9 Stirrer specifications

Variant Magnetic

Adjustment range for rotational speed +1 - +15 120 - 1,800 rpm

Rotational speed change per step 115 - 125 rpm

Maximum rotational speed 1,700 - 1,900 rpm

Stirring bar lengths 8, 12, 16, 25, 30 mm

3.10 Liquid handling specifications

Cylinder unit

Cylinder volume 5, 10, 20, 50 mL

Dosing drive

Dosing resolution 20,000 steps per cylinder volume

Dosing accuracy according to ISO/DIN 8655-3

Tubing

Tubing nipple outer thread M6

Inner diameter 2 mm

Material FEP fluorinated ethylene propylene