

## Compact Titrator

G10S/G20S



**METTLER TOLEDO**



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# 1 Introduction

## Simple and compact

The devices in METTLER TOLEDO's Titration Compact Line are modern, compact titrators for use in a wide variety of application areas. They can be used, for example, in quality control as well as in research and development.

The titrators in the Titration Compact Line perfectly combine simple, easy-to-understand operation with an extremely high level of precision and outstanding reliability. Thanks to automatic titrant recognition (Plug & Play burettes), the titrator independently identifies which titrant is required without intervention from the operator.

The large color touchscreen allows intuitive control by the user and flexibility in its adjustment options. All functions can be activated directly from the home screen via shortcuts which can be freely created, making everyday use extremely simple. Controlling the titrator by touchscreen and all adjustable parameters are described separately and in detail in the operating instructions.

The following chapters describe the steps necessary to install and begin operating your Titration Compact instrument.

The Operating Instructions, supplied as PDF file, contains the information needed to install the standard and some of the optional equipment and operate your Titration Compact instrument. If you have any additional questions, METTLER TOLEDO is always available to assist you.

## 2 Safety Notes

- Read and understand the instructions in this manual before you use the instrument.
- Keep this manual for future reference.
- Include this manual if you pass on the instrument to other parties.

If the instrument is not used according to the instructions in this manual or if it is modified, the safety of the instrument may be impaired and Mettler-Toledo GmbH assumes no liability.

### 2.1 Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

#### Signal words

<b>WARNING</b>	for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
<b>CAUTION</b>	for a hazardous situation with low risk, resulting in minor or medium injuries if not avoided.
<b>NOTICE</b>	for a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data.
<b>Attention</b>	(no symbol) for important information about the product.
<b>Note</b>	(no symbol) for useful information about the product.

#### Warning symbols

	General hazard		Electrical shock		Toxic substance
	Harmful substance		Inflammable or explosive substance		Acid / Corrosion

### 2.2 Product Specific Safety Notes

The instrument has been tested for the experiments and intended purposes documented in the appropriate manual. However, this does not absolve you from the responsibility of performing your own tests of the products supplied by us regarding their suitability for the methods and purposes you intend to use them for.

#### Intended use

This instrument is designed to be used in analytical laboratories by qualified staff. The instrument is suitable for the processing of reagents and solvents.

Any other type of use and operation beyond the limits of technical specifications without written consent from Mettler-Toledo GmbH, is considered as not intended.

#### Site requirements

The instrument has been developed for indoor operation in a well-ventilated area. Avoid the following environmental influences:

- Conditions outside of the ambient conditions specified in the technical data
- Powerful vibrations
- Direct sunlight
- Corrosive gas atmosphere

- Explosive atmosphere of gases, steam, fog, dust and flammable dust
- Powerful electric or magnetic fields

### Staff qualification

Incorrect use of the instrument or the chemicals used in the analysis can lead to death or injury. The following qualifications are needed for operating the instrument.

- Knowledge and experience in working with toxic and caustic substances.
- Knowledge and experience in working with standard laboratory equipment.
- Knowledge and experience in working in accordance with general lab safety rules.

### Responsibilities of the instrument owner

The instrument owner is the person that uses the instrument for commercial use or places the instrument at the disposal of his staff. The instrument owner is responsible for product safety and the safety of staff, user and third party.

The operator has the following responsibilities:

- Know the rules for safety at the workplace that are in effect and enforce them.
- Ensure that only qualified staff uses the instrument.
- Define the responsibilities for installation, operation, cleaning, troubleshooting and maintenance and ensure that the tasks are done.
- Train the staff in regular intervals and inform them about dangers.
- Provide the necessary protective gear for the staff.

### Shut down of the instrument in emergency situations

- Pull the plug from the electrical outlet.

### Protective Clothing

Wear protective clothing in the laboratory when working with hazardous or toxic substances.



Wear suitable eye protection such as goggles.



Use appropriate gloves when handling chemicals or hazardous substances and check their integrity before use.



Wear a lab coat.

### Safety notes



#### **⚠ WARNING**

#### **Danger of death or serious injury due to electric shock!**

Contact with parts that contain a live current can lead to injury and death.

- 1 Only use a 3-pin grounded electrical outlet and extension cables to connect your instrument.
- 2 Keep all electrical cables and connections away from liquids.



### **WARNING**

#### **Danger of injuries and death due to harmful substances!**

Chemicals can cause injuries if they come in contact with bare skin or are inhaled.

- 1 When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.
- 2 Set up the instrument in a well-ventilated location.
- 3 Clean any spills immediately.
- 4 If you measure substances which form toxic gases, place the instrument in a fume hood.



### **WARNING**

#### **Danger of death and serious injuries due to flammable solvents!**

Flammable solvents can ignite and lead to fire and explosions.

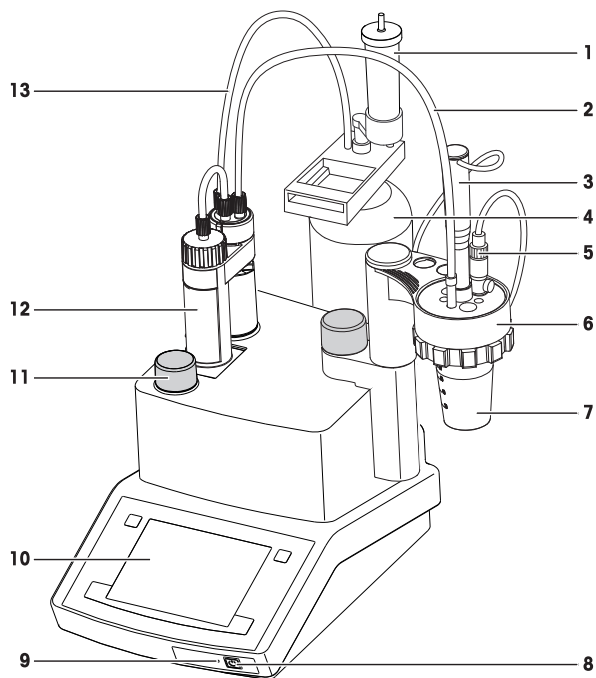
- 1 Keep flammable solvents away from naked flames.
- 2 When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.



### 3 Design and function

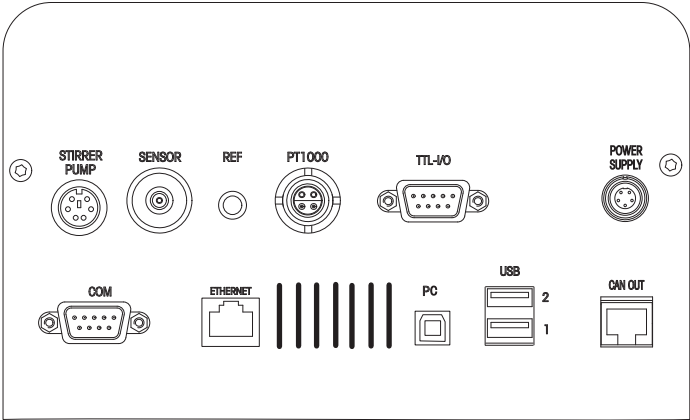
#### 3.1 Instrument

##### 3.1.1 Overview



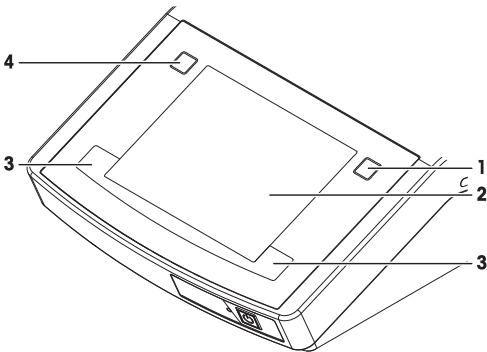
1	Titrant bottle drying tube	8	On/Off button
2	Dispensing tube	9	Indicator light (LED)
3	Compact stirrer	10	Touchscreen
4	Titrant bottle	11	Burette arrestment knob
5	Electrode	12	Burette
6	Titration stand	13	Suction tube
7	Titration vessel		

3.1.2 Titrator rear panel connections



Connection	Use	Example
STIRRER PUMP	Stirrer / pump	Solvent manager /compact stirrer / pump
SENSOR	Measuring electrode	DGi115-SC
REF	Reference input to SENSOR	
PT1000	PT1000 temperature sensor	DT1000
TTL-I/O	Sample changer	Rondolino
POWER SUPPLY	Power supply	Power supply
COM	Balance	MS analysis balance
ETHERNET	Network	Link to LabX PC software via network
PC	PC connection via USB	Link to LabX PC software via USB interface
USB1 / USB2	Printer / Memory stick / USB hub	USB-P25 compact printer
CAN OUT	CAN connection	For service use

3.1.3 Terminal



1	<b>Info button</b> Accesses the interactive online help for the content of the current dialog.	3	<b>Home button</b> Returns you to the homescreen from any menu position.
2	Display (Touchscreen)	4	<b>Reset button</b> Ends all tasks that are currently running.

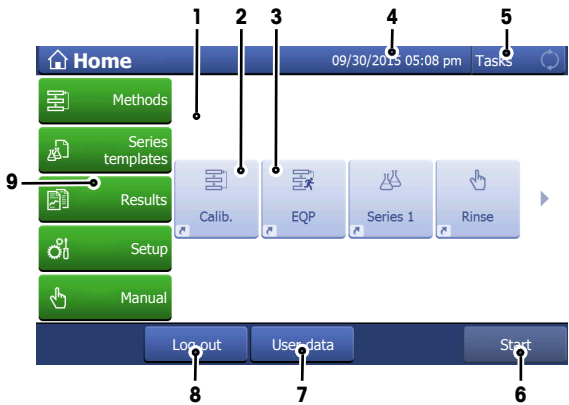
3.2 User interface



NOTICE

**Danger of damaging the touch screen with pointed or sharp objects!**  
Pressing on the touch screen with pointed or sharp objects may be damaged it.  
– Operate the touch screen by applying gentle pressure with the pad of your finger.

3.2.1 Homescreen



	Name	Explanation
1	<b>Shortcut area</b>	User-specific shortcuts for frequently used methods. Shortcuts are saved in the user profile and can be defined, changed and deleted by the user.
2	<b>Shortcut</b>	This type of shortcut opens the dialog <b>Start analysis</b> .

	Name	Explanation
3	Shortcut	This type of shortcut starts the method without opening the dialog <b>Start analysis</b> .
4	Status bar	The status bar contains the current menu item, user name as well as date and time.
5	Instrument status	Shows the current working status of the instrument. <b>Blue</b> No measurement running <b>Green</b> Measurement running
6	Start button	Switch to direct measurement (quick start for the defined standard measurement of this instrument).
7	User data	Information menu about the currently logged in user.
8	User log out	Directly log out the current user. The menu <b>Login</b> is displayed after logging out.
9	Menus	<b>Methods</b> Create and handle methods for every measurement type. <b>Series templates</b> Open the menu for series templates for every method available on the instrument. <b>Results</b> Display all measurement results, print out or export them. Visit detail information about every single result. <b>Setup</b> Define all system settings in this menu, e.g. hardware settings, user management or user preferences. These settings are usually made during installation of the instrument. <b>Manual</b> Some specific manual operations on the instrument and connected external devices can be done here.

### 3.2.2 Input field types

In the single menus you have different kinds of parameter-fields to enter information, values or names or to choose an option in a drop-down list. Depending on the input field (value or name) you will get a numeric or alphabetic keypad for entering your values.



#### Text input field

Any text comprised of letters (up to 30 characters), numbers and symbols can be entered into these fields.



#### Text input field (extended)

Any text comprised of letters (up to 500 characters), numbers and symbols can be entered into these fields.



#### Number input field

Numbers, formulas and auxiliary values can be entered into these fields.



#### Drop-down list

A drop-down list opens from which you can select an entry.



#### Shortlist

A shortlist opens from which you can select an entry.



#### Formula field

A formula must be entered in these fields.

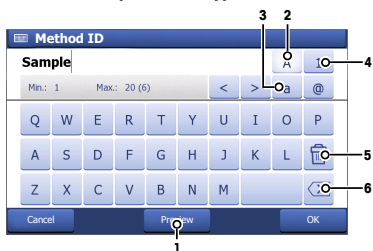


### Info field

The displayed content is only for information (read only).

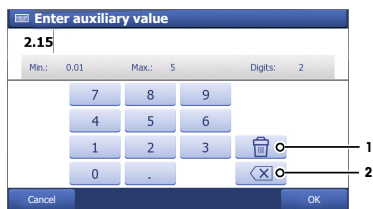
## 3.2.3 Keypads

### Alphabetic keypad



- Tap (1) to see how your input looks like.
- Tap (2) for capital letters.
- Tap (3) for lowercase letters.
- Tap (4) to switch to a numeric keypad and (2) to turn back to alphanumeric.
- Tap (5) to delete all entered letters or numbers.
- Tap (6) to delete the last entered letter or number.

### Numeric keypad



- Tap (1) to delete all entered numbers.
- Tap (2) to delete the last entered number.

## 3.2.4 Menu Structure

### Menu Structure

Level 1	Level 2	Level 3
Methods	-	-
Series templates	-	-
Results	All results	-
	Statistics	-
	Samples	-
	Undo all	

Level 1	Level 2	Level 3
<b>Setup</b>	<b>Chemicals</b>	<b>Titrants</b>
		<b>Auxiliary reagents</b>
		<b>Calibration standards</b>
		<b>Titer standards</b>
		<b>Substances</b>
	<b>User settings</b>	<b>Language</b>
		<b>Screen</b>
		<b>Audio signal</b>
		<b>Shortcuts</b>
		<b>Keyboard</b>
	<b>Values</b>	<b>Blanks</b>
		<b>Auxiliary values</b>
	<b>Hardware</b>	<b>Sensors</b>
		<b>Pumps</b>
		<b>Peripherals</b>
		<b>Titration Stands</b>
		<b>Auxiliary Instruments</b>
	<b>Global settings</b>	<b>System</b>
		<b>User management</b>
		<b>Analysis and resources behavior</b>
	<b>Mainten. &amp; Service</b>	<b>MT-Service</b>
		<b>Import / Export</b>
		<b>Reset to factory settings</b>
		<b>Titration firmware history</b>
		<b>Board firmware</b>
		<b>Terminal</b>
		<b>Board data</b>
		<b>Drives</b>
		<b>Burettes</b>
		<b>Update</b>
<b>Manual</b>	<b>Stirrer</b>	-
	<b>Sensor</b>	-
	<b>Burette</b>	<b>Rinse</b>
		<b>Rinse multiple burettes</b>
		<b>Dispense</b>
		<b>Manual titration</b>
	<b>Pump</b>	-
	<b>Auxiliary Instruments</b>	-

## 4 Installation



### NOTICE

#### **Danger of damage to the instrument due to incorrect parts!**

Using incorrect parts with the instrument can damage the Instrument or cause the instrument to malfunction.

- Only use parts supplied with the instrument, listed accessories and spare parts from METTLER TOLEDO.

This chapter describes the installation of the G10S and the G20S Compact Titrator.

### 4.1 Scope of delivery

Component	G10S	G20S	G20S Rondolino
Compact Titrator	•	•	•
Sample changer Rondolino TTL	-	-	•
Replacement burette (DV1020), complete 20 mL	•	•	•
External power supply (100...240 V)	•	•	•
Power cable (country-specific)	•	•	•
Protective cover for touchscreen	•	•	•
Titration stand without accessories	•	•	-
Spacing ring	•	•	-
Clamping ring	•	•	-
Threaded ring	•	•	-
Cap (for titration stand)	•	•	-
Clamping screw	•	•	-
Electrode holder	-	-	•
Fastening screw	-	-	•
pH electrode, DGi1 15-SC	•	•	•
Triaxial SC LEMO cable, 70 cm	•	•	•
Compact stirrer	•	•	•
Titration vessel 100 mL, made from polypropylene (2 pcs.)	•	•	•
NS 14.5 stopper (3 pcs.)	•	•	•
NS 7.5 stopper (3 pcs.)	•	•	•
3 mol/L KCl (25mL)	•	•	•
Drying tube with cover	•	•	•
Drying tube holder	•	•	•
CD Titration User Documentation	•	•	•
User Manual	•	•	•
Memo Card	•	•	•
EC declaration of conformity	•	•	•

### 4.2 Connecting the AC adapter

The titrator is operated using an external AC adapter. The AC adapter is suitable for all supply line voltages ranging from 100...240 V AC  $\pm 10\%$  and 50-60 Hz.



## ⚠ WARNING

### **Danger of death or serious injury due to electric shock!**

Contact with parts that contain a live current can lead to injury and death. If the instrument cannot be shut down in an emergency situations, people can be injured or the instrument can be damaged.

- 1 Check the cables and the plug for damage and replace damaged cables and plugs.
- 2 Ensure that the cables are arranged so that they cannot be damaged or interfere with the operation.
- 3 Ensure that the power plug is accessible at all times.

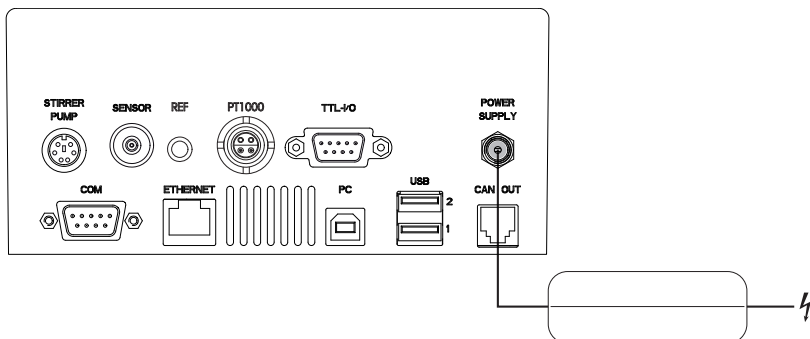


## NOTICE

### **Danger of damage to the AC adapter due to overheating!**

If the AC adapter is covered or in a container, it is not sufficiently cooled and overheats.

- 1 Do not cover the AC adapter.
- 2 Do not put the AC adapter in a container.



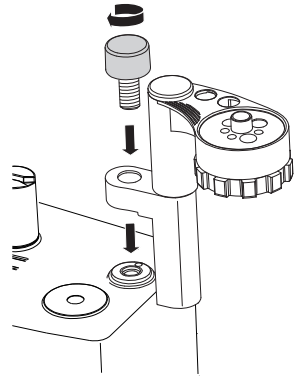
- 1 Connect the AC adapter to the "POWER SUPPLY" socket on the rear of the titrator.
- 2 To secure the connection at the titrator, screw the plug connector firmly into place.
- 3 Connect the AC adapter to a grounded power outlet.



## 4.3 Installing the titration stand

### 4.3.1 Attaching the titration stand to the titrator

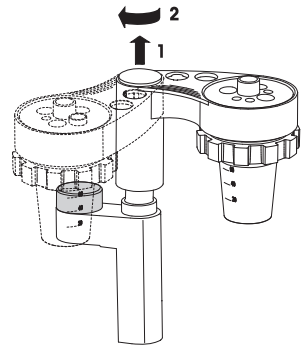
- The spacing ring, clamping ring and threaded ring are mounted on the titration stand.
- 1 Remove the cover from one of the mounting holes.
- 2 Position the titration stand over the uncovered mounting hole.
- 3 Place the screw in the hole of the titration stand and screw it in.
- 4 Tighten the screw.



### 4.3.2 Swivelling the titration stand

The titration stand can be swivelled between 3 predefined positions. It is recommended that the titration stand is used in the swivelled out position when using the compact stirrer.

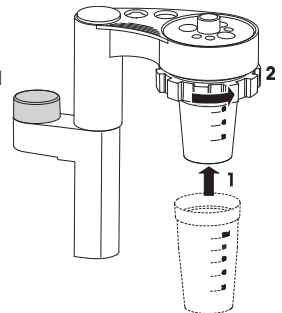
- 1 Pull the titration stand upward out of the holder until you feel resistance.
- 2 Swivel the titration stand to the desired position.
- 3 Slide the titration stand down until it rests on the holder.



### 4.3.3 Attaching and removing the titration vessel

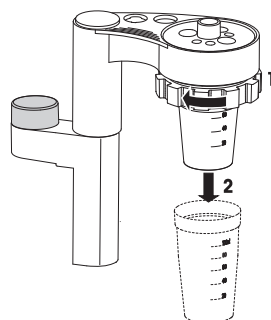
#### Attaching the titration vessel

- The titration stand is swivelled out.
- 1 Turn the threaded ring a quarter to a half turn clockwise.
- 2 Guide the titration vessel upward (1) into the titration stand and hold the titration vessel in place.
- 3 Tighten the threaded ring (2).
- 4 Check that the titration vessel is firmly attached before you let it go.



### Removing the titration vessel

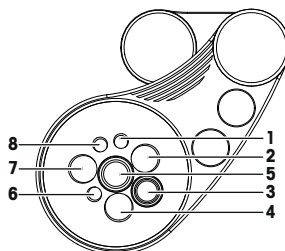
- The titration stand is swivelled out.
- 1 Hold the titration vessel with one hand.
- 2 Turn the threaded ring a quarter to a half turn clockwise (1).
- 3 Pull the titration vessel downward (2) out of the titration stand.



### 4.3.4 Connecting the titration stand

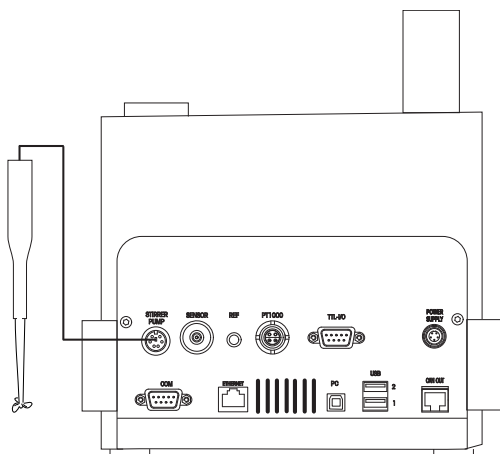
The titration stand can be assembled with a stirrer, various sensors, dispensing tubes and stoppers. The titration arm is normally connected as illustrated.

- 1 Dispensing tube
- 2 Sensor
- 3 Sensor or rinsing unit
- 4 Sensor
- 5 Compact stirrer
- 6 Dispensing tube
- 7 Sensor
- 8 Dispensing tube



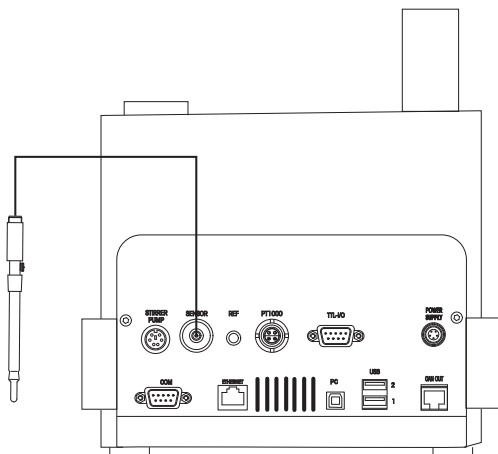
### 4.4 Connecting the compact stirrer

- 1 Insert the compact stirrer into the correct opening in the titration stand.
- 2 Turn the titrator off.
- 3 Plug the compact stirrer into the "STIRRER / PUMP" socket on the rear of the titrator.
- 4 Turn the titrator on.
- ⇒ The titrator detects the connected compact stirrer.



## 4.5 Connecting the measuring electrode

- 1 Insert the measuring electrode into the correct opening in the titration stand.
  - 2 Make sure that no task is running on the titrator.
  - 3 To connect the measuring electrode, plug the triaxial cable into the "SENSOR" socket on the rear of the titrator.
- ⇒ The titrator detects the connected measuring electrode.

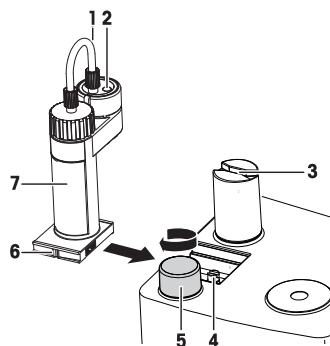


## 4.6 Inserting and connecting a burette

Current generation burettes are equipped with an Smart Tag on the holder (visible by the small, black cover plate). The Smart Tag is used for reading and writing properties such as titrant name, concentration or usable life.

- The burette is assembled (see operating instructions supplied with burettes).
- The burette holder is mounted on the titrant bottle (see operating instructions supplied with burettes).
- The piston rod (4) is in the home position.

- 1 Turn the arrestment knob (5) in the opposite direction of the arrow.
- 2 Orient the burette so that the recesses on the driver arm (3) are parallel to the slide-on part (6) of the burette.
- 3 Slide the burette (7) either from onto the titrator.
- 4 Turn the arrestment knob (5) in the direction of the arrow to secure the burette.



- 5 Place the suction tube from the titrant bottle into the left hole (1) of the burette.
- 6 Place the dispensing tube into the right hole (2) of the burette.

### 7 **WARNING** Danger of death and injury due to corrosive and toxic substances!

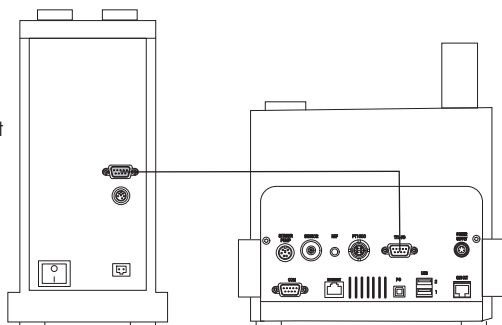
Place the free end of the dispensing tube into the titration vessel, the waste bottle or another suitable container.

## 4.7 Connecting the Rondolino TTL sample changer

The G10S and the G20S compact titrator support the Rondolino sample changer. The installation of the Rondolino is described in the separate Rondolino operating instructions.

The Rondolino sample changer is controlled by TTL signals from the titrator.

- 1 Turn the titrator off.
  - 2 Plug the cable supplied with the Rondolino into the "TTL / IO" socket on the Rondolino .
  - 3 Plug the cable into the "TTL / IO" socket on the rear panel of the titrator.
  - 4 Turn the titrator on.
- ⇒ The titrator automatically detects the Rondolino.



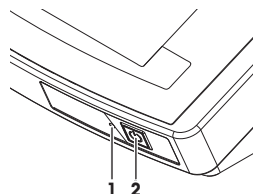
## 5 Operating the instrument

### 5.1 Switching the titrator on and into standby mode

The On/Off button is fitted with an LED and mounted on the front of the titrator. The LED indicates the operating status.

#### Switching the titrator on

- Press the On/Off button (2).
  - ⇒ The titrator starts up and detects connected devices.
  - ⇒ The LED (1) flashes as the system starts up.
  - ⇒ The titrator is ready for use when the LED (1) remains permanently lit.



#### Switching the titrator into standby mode

##### Note

In the standby mode, the control circuit for the On/Off button is energized. The rest of the instrument is no longer energized.

- Tap **Home > Log out > Shut down**.
    - ⇒ The titrator stops running tasks and shuts down.
    - ⇒ The LED (1) flashes as the system shuts down, which can take up to 60 seconds.
  - ⇒ When the LED goes out, the titrator is in the standby mode.
- or
- Press the On/Off button for less than 1 second.
    - ⇒ The titrator stops running tasks and shuts down.
    - ⇒ The LED (1) flashes as the system shuts down, which can take up to 60 seconds.
  - ⇒ When the LED goes out, the titrator is in the standby mode.

### 5.2 Running a general titration

To explain the procedure for a titration method, a simple acid-base titration with a manual titration stand is described. 5 ml of HCl solution (0.1 mol/L) is titrated with NaOH (0.1 mol/L).

#### Material

Sensor: DGI115-SC

#### Chemicals

For this titration you need the chemicals listed below.

- Approx. 5 ml of a HCl solution (0.1 mol/L)
- A titrant bottle containing a carbonate free NaOH solution (0.1 mol/L)
- 3 buffer solutions: pH 4.01, 7.00 and 9.21 from METTLER TOLEDO
- Approximately 50 mg potassium hydrogen phthalate

#### 5.2.1 Preparation

- The titrator is assembled, connected, and installed (see Installation).
  - A compact stirrer is placed in the appropriate opening on the titration stand and connected to the "STIRRER / PUMP" output of the titrator.
  - A USB printer is connected to port "USB1" or "USB2" of the titrator and configured.
- 1 Tap **Setup > Hardware > Titration Stands > Manual stand > Save**.
  - 2 Prepare the 10 ml burette for the sodium hydroxide.

- 3 To protect the NaOH solution against CO<sub>2</sub>, install a drying tube on the burette holder of the NaOH bottle.
- 4 Insert the burette.
  - ⇒ An **Info** dialog appears, which allows you to initialize the burette. Burettes only have to be initialized the first time they are used on the titrator.
- 5 If you use the burette for the first time on the titrator, tap **Initialize**.
  - ⇒ The titrator initializes the burette.
- 6 When the burette is initialized, remove the burette from the titrator and place the burette back on the titrator.
  - ⇒ The titrator recognizes the initialized burette.
- 7 To create a new titrant for the burette, tap **Create**.
- 8 To assign a titrant to the burette, tap **Assign**.
  - ⇒ The system updates the burette data and the assigned titrant appears with the suffix **PnP** in the setup.
- 9 Attach a titration vessel to the titration stand and connect the dispensing tube for the titrant to the titration head.

The following sections will give you a short overview on how to rinse and fill the burette, perform a calibration, a sensor test, a titer and a titration.

### 5.2.2 Rinsing and filling the burette

To fill the burette and tubes with titrant and remove any air bubbles from the system, rinse the burette three times with titrant with the manual operation **Rinse**.

- The titrator is prepared as described in [Preparation ► 19].
- 1 To ensure that the system has no leaks, check all tubes and closing points for firm seating.
  - 2 Make sure that the free end of the dispensing tube for the titrant is placed in the titration vessel or another container.
  - 3 Tap **Manual > Burette > Rinse**.
    - ⇒ The dialog **Rinse** opens.
  - 4 Set **Titrant** to **NaOH 0.1 mol/L**.
  - 5 Set **Cycles** to "3".
  - 6 To start the rinse procedure, tap **Start**.
    - ⇒ The rinse procedure starts and an animation shows the progress.
  - 7 When the rinse procedure is complete, tap **OK**.
    - ⇒ The dialog **Rinse** opens.
  - ⇒ The burette is filled and the tubes are free of air bubbles.

### 5.2.3 Calibrating and testing the sensor

The following describes how to calibrate a pH sensor or carry out a sensor test.

#### Preparation

- 1 Make sure no analysis is running on the titrator.
- 2 Connect the plug of the sensor (DG1115-SC) to the port "SENSOR" of the titrator.
- 3 Insert the sensor into the titration head.
- 4 Prepare three titration vessels containing buffer solutions (pH 4.01, 7.00 and 9.21).

#### 5.2.3.1 Calibrate sensor

- 1 Tap **Methods > New > Standard method templates > Calibration**.
  - ⇒ A list of method functions appears.

- 2 Tap **Sample (Calib)**.  
⇒ The dialog **Sample (Calibration)** opens.
- 3 Make sure **Sensor** is set to DGI115-SC.
- 4 Make sure the settings for the buffer are as listed below.  
**Buffer 1:** 4.01  
**Buffer 2:** 7.00  
**Buffer 3:** 9.21
- 5 Tap **OK > Save**  
⇒ The new method is saved in the method list, with the next free ID and with the title **Calibration**.
- 6 Tap **Start**.  
⇒ The dialog **Start analysis** opens.
- 7 To ensure that the system has no leaks, check all tubes and closing points for firm seating.
- 8 Tap **Start**.  
⇒ The system asks you to attach the titration vessel with sample 1 to the titration arm.
- 9 Attach the titration vessel with the buffer solution with pH 4.01 to the titration arm and tap **OK**.  
⇒ The measurement starts after the stirring time.  
⇒ During the measurement the online screen displays the time, the measured value in [mV] and a curve.  
⇒ During the calibration, the system will output a record on the printer.  
⇒ When the measurement is completed, the system asks you to attach the titration vessel with the next sample to the titration arm.
- 10 Remove the titration vessel from the titration arm.
- 11 Rinse the electrode with deionized water.
- 12 Repeat the last 3 steps for the buffer solution with pH 7.00 and the buffer solution with pH 9.21.  
⇒ When the calibration is completed, the calibration data is automatically copied to the setup.

#### 5.2.3.2 pH-sensor test

- 1 Tap **Methods > New > Standard method templates > Sensor test**.  
⇒ A list of method functions appears.
- 2 Tap **Sample (Calib)**.  
⇒ The dialog **Sample (Calibration)** opens.
- 3 Make sure **Sensor** is set to DGI115-SC.
- 4 Make sure the settings for the buffer are as listed below.  
**Buffer 1:** 4.01  
**Buffer 2:** 7.00  
**Buffer 3:** 9.21
- 5 Tap **OK > Save**  
⇒ The new method is saved in the method list with the next free ID and with the title **Sensor test**.
- 6 Tap **Start**.  
⇒ The dialog **Start analysis** opens.
- 7 To ensure that the system has no leaks, check all tubes and closing points for firm seating.
- 8 Tap **Start**.  
⇒ The system asks you to attach the titration vessel with sample 1 to the titration arm.

- 9 Attach the titration vessel with the buffer solution with pH 4.01 to the titration arm and tap **OK**.
  - ⇒ The measurement starts after the stirring time.
  - ⇒ During the measurement the online screen displays the time, measurement in [mV] and the curve.
  - ⇒ During the pH-sensor test, the system will output a record on the printer.
  - ⇒ When the measurement is completed, the system asks you to attach the titration vessel with the next sample to the titration arm.
- 10 Remove the titration vessel from the titration arm.
- 11 Rinse the electrode with deionized water.
- 12 Repeat the last 3 steps for the buffer solution with pH 7.00 and the buffer solution with pH 9.21.
  - ⇒ When the pH-sensor test is completed, the data is automatically copied to the setup.

#### 5.2.4 Determining the titer

- 1 Weigh about 50 mg of potassium hydrogen phthalate and dissolve it in a titration vessel containing deionized water.
- 2 Tap **Methods > New > Standard method template > Titer with EQP**.
  - ⇒ A list of method functions appears.
- 3 Tap **Sample (Titer)**.
- 4 Set the parameter **Entry to Before** and tap **OK**.
- 5 Tap **Titration (EQP) > Termination**.
- 6 Activate **After number of recognized EQPs**, set **Number of EQPs** to 1 and tap **OK**.
- 7 To exit the method function, tap **OK**
- 8 To save the new method, tap **Save**.
- 9 To ensure that the system has no leaks, check all tubes and closing points for firm seating.
- 10 Tap **Start**.
  - ⇒ The **Start analysis** dialog opens.
- 11 Enter the sample size.
- 12 Tap **Start**.
  - ⇒ The titer determination begins.
  - ⇒ The titrator asks you to add sample 1/1.
- 13 Attach the titration vessel with potassium hydrogen phthalate solution to the titration head and tap **OK**.
  - ⇒ The titration starts after the stirring time.
  - ⇒ During the titer determination, the online screen displays the measured pH values over the titrated volume in [mL].
  - ⇒ After the titer determination is completed, the titer is copied to the setup.
- 14 After the titer determination is completed, rinse the sensor with deionized water.

#### 5.2.5 Running an EQP titration

##### Preparing the sample

- 1 Fill 5 ml HCl (0.1 mol/L) into a titration vessel and dilute it with approx. 50 mL deionized water.
- 2 Attach the titration vessel to the titration arm.

##### Configuring the method

- 1 Tap **Methods > New > Standard method template > EQP**.
- 2 Tap **Title**.
- 3 Enter a title for the new method in the field **Title** and tap **OK**.



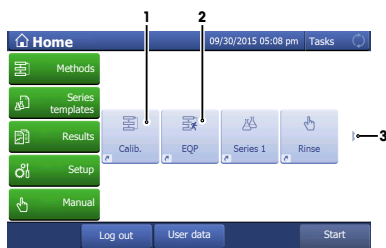
- 4 Tap **Sample**.
- 5 In the parameter **ID 1** enter your choice of ID for the sample to be analyzed.
- 6 Set **Entry type** to **Volume**.
- 7 Set **Lower limit** to 6.0 mL.
- 8 Set **Upper limit** to 50.0 mL.
- 9 Set **Entry** to **Before**.
- 10 Tap **OK**.
- 11 Tap **Titration (EQP) > Termination**.
- 12 Activate the parameter **After number of recognized EQPs**, set **Number of EQPs** to 1 and tap **OK**.
- 13 To exit the method function, tap **OK**.
- 14 Tap **Calculation R1**.
- 15 Tap **Result proposals**.
  - ⇒ A list appears containing various combinations of parameters for giving the result in different units.
- 16 Select the result with the unit **mol/L**.
  - ⇒ The main parameters in the method function **Calculation R1** are filled in automatically.
- 17 Set **M [g/mol]** to **Hydrochloric acid**.
- 18 Tap **OK**.
- 19 Tap **Calculation R2**.
- 20 Tap **Delete**.
- 21 To save the method, tap **Save**.

#### **Performing the analysis**

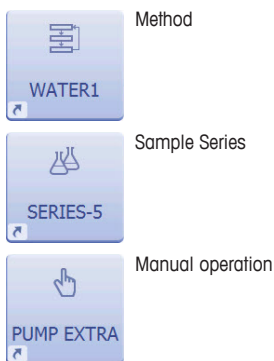
- 1 To ensure that the system has no leaks, check all tubes and closing points for firm seating.
- 2 Tap **Start**.
  - ⇒ The dialog **Start analysis** opens.
- 3 In the parameter **Enter sample size** enter your sample size.
- 4 To perform the titration, tap **Start**.
  - ⇒ You are prompted to add the sample.
- 5 If the titration vessel is not attached to the titration arm, attach the titration vessel containing the HCl solution to the titration arm and tap **OK**.
  - ⇒ The titration starts after the pre-stirring period.
  - ⇒ During the titration, the online screen displayed the measured pH values over the titrated volume in [mL].
  - ⇒ After the titration, a record is printed automatically.
  - ⇒ All results are saved.
- 6 After the titration, rinse the sensor with deionized water.
- 7 To view the saved result, tap **Home > Results**.

## 5.3 Creating and handling Shortcuts

- Shortcuts (1, 2) can be created for methods, series templates and manual operations.
- With a shortcut (1) it is possible to access the dialog **Start analysis** with one tap on the homescreen.
- With a shortcut (2) it is possible to start a method, series or manual operation with one tap on the homescreen.
- The number of shortcuts depends on the type of titrator. If more than 12 shortcuts can be created, they can be placed on two screens. Tap (3) to switch between these two screens.
- Each user can manage the shortcuts that he has created in the instrument setup.



### Types of shortcuts




### Creating a shortcut

- 1 Select **Methods** and choose your method category.
- 2 Create a new method or choose an existing method in the list.
- 3 Tap **Start**.  
⇒ The **Start analysis** dialog opens. You can change some parameters or add some information to this method.
- 4 Tap **AddToHome** to create a shortcut.
- 5 Define the shortcut parameters.
- 6 Tap **Save**.  
⇒ The shortcut is now set on the homescreen.

### Deleting a shortcut

- 1 Select **Setup > User settings > Shortcuts**.
- 2 Select the shortcut which you want to delete in the list.
- 3 Tap **Delete**.  
⇒ The shortcut is deleted.

### Changing an existing shortcut

- At least one shortcuts has been created.
- 1 Tap **Setup > User settings > Shortcuts**.
  - ⇒ A list of existing shortcuts opens.
- 2 Tap the shortcut you want to change.
- 3 If needed, change the settings for **Description** and **Immediate start**.
- 4 To change the position of the shortcut on the homescreen, tap .
  - ⇒ A dialog opens that shows the free positions and the occupied positions on the homescreen.
- 5 Tap on the free position, where the shortcut should be placed.
  - ⇒ The dialog closes.
- 6 To save the settings, tap **Save**.

Parameters	Description	Values
<b>Type</b>	Shows the type of action the shortcut stands for.	<b>Method   Series   Manual operation</b>
<b>Description</b>	Any name for the shortcut.	Arbitrary
<b>Immediate start</b>	The method, series, or manual operation can be started immediately. This enables you to start the analysis without any interfering dialog.	<b>Yes   No</b>
<b>Homescreen position</b>	Defines the position of the shortcut on the homescreen.	-
<b>Created by</b>	Shows the name of the user who created the shortcut.	-

## 5.4 Creating Methods

You create a new method by changing the parameters of a delivered method template and saving it under a new method ID.

Navigation: **Home > Methods**

- 1 Tap **New** to create a new method on the basis of a template.
- 2 From the available templates, in **Mettler method templates** or **Standard method templates**, choose the one that is most similar to the method you wish to create.
  - ⇒ You can now modify this method in line with your requirements by inserting or removing method functions or modifying its parameters.
- 3 In the method function **Title**, enter a new method ID. Afterwards, a new method will be stored under this method ID.
- 4 Assign a title to your new method.
- 5 Select available method functions to modify their parameters in line with your requirements.
- 6 Tap **Insert** to add additional method functions to the template.
- 7 Now use the arrow-shaped button to select the required position for the new method function in the method. (You will only be able to insert the method functions that are allowed in the corresponding location based on the method syntax.)
- 8 From the list, select the method function that you want to insert.
- 9 Modify the individual parameters of the method function in line with the resources.
  - ⇒ The new method function appears in the method.
- 10 To delete a method function, select the function in question and then tap **Delete**.
  - ⇒ The method function disappears from the method.
- 11 After inserting all required method functions, tap **Save**.
  - ⇒ The method is saved under the method ID and appears in the list of available methods.

### Note

- When establishing a new method, follow the rules specified by the instrument.

## 5.5 Modifying or Deleting Methods

You can change user methods or Mettler methods and store them under new method IDs.

### Note

- Once a Mettler method has been modified, you will only be able to save it as a copy (or as a user method) with a new method ID.

Navigation: **Home > Methods**

- 1 From the displayed list of methods, select the method that you want to modify.
- 2 As soon as the methods functions of the selected method appear on the screen, you can modify the method.
- 3 In the method function **Title**, enter a new method ID. Afterwards, a new method will be stored under this method ID. You can enter up to twenty alphanumeric characters.
- 4 Select available method functions to modify their parameters in line with your requirements.
- 5 Choose **Insert** to add additional method functions to the template.
- 6 Now use the arrow-shaped **Insert** button to select the required position for the new method function in the method. (You will only be able to insert the method functions that are allowed in the corresponding location based on the method syntax.)
- 7 From the list, select the method function that you want to insert.
- 8 Modify the individual parameters of the method function.  
⇒ The new method function appears in the method.
- 1 To delete a method function, select the function in question and then choose **Delete**.
- 2 After you have made all of the necessary adjustments, you can store the method in the titrator by choosing **Save**.

### Deleting Methods

You can easily delete user-defined methods from the titrator. Select:

Navigation: **Home > Methods**

- 1 Select the method that you want to delete.
- 2 Choose **Delete method** to delete the method from the titrator's memory.

## 5.6 Starting Methods

The titrator offers various ways of starting a method:

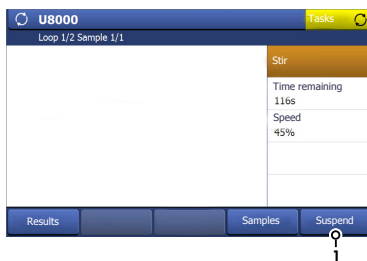
- From the method editor
- By choosing **Start** from the Home dialog
- By using a shortcut on the Home screen
- Via the **Series** dialog
- By using the **Setup** dialog (to perform a calibration or titer determination)

You can use the method editor to start any method stored in the titrator.

- 1 From the displayed list in the **Methods** dialog, select the method that you wish to start (Home > Methods).
- 2 As soon as the method functions of the selected method appear on the screen, you can open the **Start analysis** screen by choosing **Start**.
- 3 Choose **Start** again to reach an overview screen on the resources required for the method. (Only if this was defined in the analysis sequence settings.)
- 4 To execute the method, confirm the screen by choosing **OK**.

## 5.7 Suspending or stopping an analysis

- 1 Tap **Suspend** (1) to suspend the current analysis.  
⇒ The dialog **Suspending options** opens.



- 2 Tap **Save series data** (1) to save the current sample series. Only the completed samples will be saved.  
⇒ If the maximum permitted number of series has been reached, the series is not saved.  
⇒ Sample data from a method that is waiting in a queue can be saved by selecting **Suspend** > **Save series data**.
- 3 Tap **Skip sample** (2) to skip the current sample and continue with the next sample of the series.  
⇒ The current sample is marked in **Results** as **Excl.**.
- 4 Tap **Skip loop** (3) to skip the loop and continue with the next loop of the series.  
⇒ The loop is marked in **Results** as **Excl.**.
- 5 Tap **Continue** (4) to continue with the current sample.
- 6 Tap **Stop definitely** (5) to stop the current method.



### Note

- If a **Calib.** loop is skipped, the analysis continues in accordance with the corresponding method function **Calibration**.
- If required, it is possible to include a skipped sample (**Excl.**) into a statistic manually in the dialog **Results**.

## 5.8 Customizing touch screen and signals

Navigation: **Setup** > **User settings**

### 5.8.1 Changing the language

In the menu **Language** you can set the language of the touch screen and the language for printing.

- 1 Tap **Setup** > **User settings** > **Language**.
- 2 Customize the settings.
- 3 To save the settings, tap **Save**.

Parameters	Description	Values
<b>Touchscreen</b>	Defines the language for operation of the terminal.	German   English   French   Italian   Spanish   Portuguese   Chinese   Russian   Polish   Korean
<b>Record</b>	Defines the language in which the reports are to be printed out.	German   English   French   Italian   Spanish   Portuguese   Chinese   Russian   Polish   Korean

### 5.8.2 Changing the screen settings

In the menu **Screen** you can customize following features.

- The color of the status bar, the borders and the buttons.
- The brightness of the touch screen.
- Activate or deactivate the screen saver and set the time before the screen saver is activated.

- 1 Tap **Setup > User settings > Screen**.
- 2 Customize the settings.
- 3 To save the settings, type **Save**.

Parameters	Description	Values
<b>Primary color</b>	Here various color schemes for the user interface can be selected.	Gray   Blue   Green   Red
<b>Brightness</b>	Specifies the display brightness in [%].	50   60   70   80   90   100 [%]
<b>Screen saver</b>	Here you can define whether the screen saver should be used.	<b>Yes   No</b>
<b>Wait time</b>	Defines how long in [min] the system should wait after the user's last action on the terminal before activating the screen saver.	1...1000

### 5.8.3 Configuring the audio-signals

In the menu **Audio signal** you can define if a tap on a button is confirmed by a beep.

- 1 Tap **Setup > User settings > Audio signal**.
- 2 Customize the settings.
- 3 To save the settings, type **Save**.

Parameters	Description	Values
<b>At push of a button</b>	Enables a beep when tapping on the touch screen.	<b>Yes   No</b>

### 5.8.4 Configuring the keyboards

In the menu **Keyboards** you can set the layout of the alphanumeric and the numeric keyboards.

- 1 Tap **Setup > User settings > Keyboards**.
- 2 Customize the settings.
- 3 To save the settings, type **Save**.

Parameters	Description	Values
<b>ABC keyboard</b>	Determines the layout of the alphanumeric input field.	<b>English   French   German</b>
<b>123 keyboard</b>	Defines the organization of the keys for the numeric input field.	<b>Calculator   Phone</b>

## 6 Transporting the titrator

If you transport the titrator over long distances, use the original packaging.



### **WARNING**

#### **Danger of injury through corrosion**

Corrosive chemicals can cause injuries if they leak out of tubing connections, burettes and titration vessels during transport.

- Before transporting the titrator, remove all parts that contain chemicals.

- 1 Unplug the titrator.
- 2 Remove all cable connections.
- 3 Empty the titration vessel.
- 4 Empty all tubes.
- 5 Remove the titration vessel from the titration stand.
- 6 Remove all tubes.
- 7 Remove all burettes.
- 8 Move the titrator to the new location.

## 7 Care and maintenance

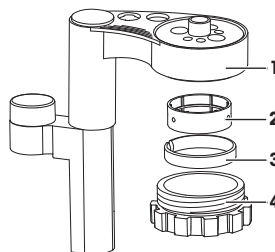
### 7.1 Cleaning

#### Housing of the titrator

- 1 Unplug the titrator.
- 2 Clean the housing of the titrator using a cloth moistened with alcohol.

#### Titration stand

- 1 Loosen the threaded ring (4) and remove it from the titration stand (1).
- 2 Remove the clamping ring (3) and the spacing ring (2) from the titration stand (1).
- 3 Clean the parts of the titration stand.
- 4 Place the clamping ring (3) and the spacing ring (2) in the threaded ring (4).
- 5 Screw the threaded ring (4) into the titration stand.



### 7.2 Maintenance

Mettler Toledo recommends that a preventive maintenance and calibration certification is done at least once a year through your local Mettler Toledo Service Organisation.



#### NOTICE

##### **Danger of damage to the titrator through leaking burettes!**

Substances leaking out of burettes can enter the housing and damage parts of the installed boards.

- Check the burettes for leaks and replace leaking burettes.

#### Daily

- Remove the burettes from the titrator.
- If you work with corrosive substances, rinse the burettes.
- If you work with corrosive substances, check the burettes for leaks and replace leaking burettes.

#### Weekly

- If you use the burettes daily, check the burettes for leaks and replace leaking burettes.

#### Before periods of inactivity

- Unplug the titrator.
- Rinse the burettes.
- Empty the titration vessel.
- Empty all tubes.
- Remove the titration vessel from the titration stand.
- Remove the burettes from the titrator.



## 8 Disposal

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.



## 9 Technical data

<b>Power supply</b>	Input voltage	100...240 V AC $\pm 10\%$
	Input frequency	50–60 Hz
	Primary connection socket	3 pin, IEC C14
	Power consumption	24 VA
	Connected load	24 V DC, 1.25 A
	Secondary connection plug	2 pin, DC plug
<b>Dimensions</b>	Width	210 mm
	Depth	333 mm
	Height	308 mm (with titration stand) 320 mm (ready-to-operate device)
	Weight	4.2 kg
<b>Materials</b>	Titration housing	Crastin® PBT
	Cover sheet	PET
	Protective cover	Copolymer
	Chassis	Stainless steel
	Titration stand	Crastin® PBT
	Lid (titration beaker)	Polypropylene
	Threaded ring	Polypropylene
	Three hole adapter	Polypropylene
	Dispensing tube / extraction tube	FEP
	Air tubes	Silicone
	O-ring (screw top)	EPDM
	O-ring (threaded ring)	FEP / silicone
	Sealing ring (bottle)	PTFE / silicone
	Seal (dispensing tube / extraction tube)	PTFE
	Connecting piece	Polypropylene
<b>Ambient conditions</b>	Ambient temperature	+5 °C - 40 °C
	Relative humidity	Max. 80 % (non-condensing) at 31 °C, linear fall to 50 % at 40 °C
	Use	In interior spaces
	Overvoltage category	II
	Pollution degree	2
	Max. installation height	2000 m (above sea level)

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### Power Management

The devices have a power management system which prevents the titrator from switching off unexpectedly in the event of a power overload. Tasks which would cause a power overload, because a number of pumps, stirrers and burette drives are already in use, cannot be started at all. A

notification brings the start attempt to the attention of the user. It is advisable, if possible, to connect pumps and stirrers directly to sample changers or other devices which have their own power supply, such as a TBox, instead of to the titrator itself.









**To protect your product's future:**  
METTLER TOLEDO Service assures  
the quality, measuring accuracy and  
preservation of value of this product  
for years to come.

Please request full details about our  
attractive terms of service.

[www.mt.com/titration](http://www.mt.com/titration)

For more information

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