Operating Instructions

Piston Burette

TITRONIC® basic

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Fig. 1 Piston Burette TITRONIC® basic
with Stirrer TM 96
with manual key button
with stand
with electrode / burette tip holder
with bottle set TZ 2007/TZ 2004 (not included in the delivery)
1 Properties of the Piston Burette TITRONIC® basic

The Piston Burette TITRONIC® basic can be used to carry out all common titrations.

The most important prerequisite for accurate titration is the accurately functioning dosing technology. In addition to the high-precision glass cylinder made of DURAN® borosilicate glass, the virtually play-free spindle ensure correct titration results.

All parts coming into contact with the titration and dosing solutions are made of chemically resistant materials. Analysis accuracy is guaranteed by the high-precision glass cylinder and the spindle for the piston feed. The controlled three/two-way valve, the easy-to-read consumption display with its additional status messages, the stand/stirrer system, and the practical manual key button make the Piston Burette TITRONIC® basic a device with comfortable use properties.

1.1 Dosing and titration solutions

To save titration solution and to render the disposal of the chemicals after the analysis as simple as possible, we recommend to select any titration solution consumption between 5 ml and 15 ml for titration.

Solutions to be used:
In practice, any solutions and liquids with the viscosity of \(< = 10 \text{ mm}^2 / \text{s}\) can be used, such as e.g. concentrated sulphuric acid, non aqueous titration (for example perchloric acid in glacial acetic acid). However, chemicals attacking glass, PTFE or FEP, or which are explosive, such as e.g. hydrofluoric acid, sodium acid or bromine must not be used! Suspensions with a high solid contents may block or damage the dosing system.

General rules:
The respectively applicable safety guidelines on handling chemicals are to be observed under all circumstances. This applies in particular to inflammable and/or etching liquids.
Wir erklären in alleiniger Verantwortung, daß das Produkt Kolbenbürette TITRONIC® basic auf das sich diese Erklärung bezieht, übereinstimmt mit den Normen DIN EN ISO 8655, Teil 3 und mit dem normativen Dokument Technische Daten. 

SCHOTT-GERÄTE GmbH
Im Langgewann 5
D-65719 Hofheim am Taunus
Deutschland, Germany, Allemagne

We declare under our sole responsibility that the products Piston Burette TITRONIC® basic to which this declaration relates is in conformity with the standards and the normative document. 

Technische Daten
Kolbenbürette TITRONIC® basic
18.09.2000

Nous déclarons sous notre seule responsabilité que le produit Burette à piston TITRONIC® basic auquel se réfère cette déclaration est conforme aux normes DIN EN ISO 8655, Teil 3 et au document normatif Technische Daten. 

SCHOTT-GERÄTE GmbH
Im Langgewann 5
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AGQSF 0000-A067-00/001213
Technical data of the Piston Burette TITRONTIC® basic  

Conformity: DIN EN ISO 8655, Part 3 and DIN 12 650, Part 5, conformity sign according to the Council Directive 89/336/EMC (electromagnetic compatibility); Generic emission according to EN 50 081, Part 1; Generic immunity according to EN 50 082, Part 2; according to the Council Directive 73/23/EMC, (low-voltage directive) 

Country of origin: Made in Germany 

Cylinder: 20 ml DURAN® borosilicate glass cylinder 

UV protection: Protective coating material: Ultem 1000, amber 

Valve: Motor-driven 3/2-way valve made of PTFE / ETFE 

Hoses: FEP with UV protection 

Dosing accuracy: DIN EN ISO 8655, Part 3, or better 

typical: systematic error \( \leq 0.1 \% \)  
random error \( \leq 0.05 \% \) 

according to table 1 DIN EN ISO 8655, Part 3 

Volume display: 00.00 ... 99.99 ml with a resolution of 0.01 ml 

Display: 4-digit LCD display 20 x 48 mm, digit height 12.7 mm 

Connections: 

Manual key button: Plug connection: 4-channel mini DIN round plug  

Stirrer: Plug connection with integrated low-voltage supply (15 V =) in the casing bottom of the Piston Burette TITRONTIC® basic for TM 96 Stirrer 

RS-232-C interfaces: for connecting a printer with a serial RS-232-C interface or a computer (PC) for documenting the consumption in terms of millilitres 

Plug connection: 4-channel round plug mini DIN 

Configuration of the RS-232-C interfaces, fixed settings:  

4800 baud, 7 bits word length, 2 stop bits, no parity 

Power supply: corresponds to Protection Class II according to DIN EN 61 010, Part 1, not suitable for use in environment with explosion hazard 

Mains: 230 V~; 50 / 60 Hz or 115 V~; 50 / 60 Hz, modification inside the device 

Power draw: 18 VA 

Materials: Casing: Polypropylene with flame shield equipment, corresponds to UL 94 VO 

Front foil: Polyester 

Casing dimensions: 135 x 310 x 205 mm (w x h x d), height incl. dosing unit, excluding stirrer 

Weight: approximately 2.0 kg 

Ambient conditions: Ambient temperature: + 10 ... + 40 °C for operation and storage 

Humidity according to EN 61 010, Part 1: 

Max. relative humidity 80 % for temperatures up to 31 °C, linear decrease down to 50 % relative humidity at a temperature of 40 °C 

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2 Warning and safety information

The Piston Burette TITRONIC® basic corresponds to protection class II. It was manufactured and tested according to DIN EN 61 010, Part 1, Protective Measures for Electronic Measurement Devices and has left the factory in an impeccable condition as concerns safety technology. In order to maintain this condition and to ensure safe operation, the user should observe the notes and warning information contained in the present operating instructions. Development and production is done within a system which meets the requirements laid down in the DIN EN ISO 9001 standard.

For reasons of safety, the Piston Burette TITRONIC® basic must be opened by authorised persons only; this means, for instance, that work on electrical equipment must only be performed by qualified specialists.

⚠️ In the case of nonobservance of these provisions the Piston Burette TITRONIC® basic may constitute a danger: electrical accidents of persons or fire hazard. Moreover, in the case of unauthorised intervention in the Piston Burette TITRONIC® basic as well as in the case of negligently or deliberately caused damage, the warranty will become void. ⚠️

Prior to switching the device on it has to be ensured that the operating voltage of the Piston Burette TITRONIC® basic matches the mains voltage. The operating voltage is indicated on the specification plate. Nonobservance of this provision may result in damage to the Piston Burette TITRONIC® basic or in personal injury or damage to property.

If it has to be assumed that safe operation is impossible, the Piston Burette TITRONIC® basic has to be put out of operation and secured against inadvertent putting to operation. In this case please switch the Piston Burette TITRONIC® basic off, pull plug of the mains cable out of the mains socket, and remove the Piston Burette TITRONIC® basic from the place of work.

Examples for the assumption that a safe operation is no longer possible,

- the package is damaged,
- the Piston Burette TITRONIC® basic shows visible damages,
- the Piston Burette TITRONIC® basic does not function properly,
- liquid has penetrated into the casing.

The Piston Burette TITRONIC® basic must not be stored or operated in humid rooms.

For reasons of safety, the Piston Burette TITRONIC® basic must only be used for the range of application described in the present operating instructions.

In the case of deviations from the intended proper use of the device, it is up to the user to evaluate the occurring risks.

⚠️ The relevant regulations regarding the handling of the substances used have to be observed: The Decree on Hazardous Matters, the Chemicals Act, and the rules and information of the chemicals trade. It has to be ensured on the side of the user that the persons entrusted with the use of the Piston Burette TITRONIC® basic are experts in the handling of substances used in the environment and in the Piston Burette TITRONIC® basic, or that they are supervised by specialised persons, respectively.

During all work with titration solutions: ⚠️ Please wear protective glasses! ⚠️

When the piston moves upwards within the cylinder, owing to the design of the system, a microfilm of dosing liquid or titration solution will always remain adhered to the inner wall of the cylinder, but this has no influence on the dosing accuracy. This small residue of liquid, however, may evaporate and thus penetrate into the zone underneath the piston, and if inadmitted liquids are being used, the materials of the Piston Burette TITRONIC® basic may be dissolved or corroded (please refer also to "Maintenance and Care").

The Piston Burette TITRONIC® basic is equipped with integrated circuits (EPROMs). X rays or other high-energy radiation may penetrate through the device’s casing and delete the program.

Please note also the corresponding operating instructions for the devices to be connected.
3 Setting up and commissioning

3.1 Unpacking and setting up the Piston Burette TITRONIC® basic

The Piston Burette TITRONIC® basic and all its accessories are ex-works thoroughly tested for correct functioning and dimensional accuracy and, apart from the Stirrer TM 96 (optional), the stand rod and the manual key button, installed ready for operation. Please note that also all the small accessories are taken out of the packing.

Set up the Piston Burette TITRONIC® basic on any flat surface, and connect the mains plug to the mains socket. Prior to plugging in the mains plug it has to be ensured that the operating voltage of the device corresponds to the mains voltage. The operating voltage is indicated on the rating plate on the bottom of the Piston Burette TITRONIC® basic. The piston burette is not suitable for use in hazardous environments.

3.2 Installation of the stirrer

Insert the stirrer at the lower right side and fasten it by pushing backwards. This automatically connects the power supply to the Stirrer TM 96.

Fig. 2: Installing the stirrer:
Insert the stirrer from below into the contact openings of the piston burette, then push the Stirrer TM 96 backwards until it latches.

Fig. 3: Piston Burette TITRONIC® basic viewed from below:

Fig. 4: Removing the stirrer:
Lift latch slightly, push the stirrer forwards and remove it downwards.
3.3 Installation of the stand

Insert the TZ 3665 Stand Rod at the right side (Fig. 4) and fasten it on the back panel of the Piston Burette TITRONIC® basic using the two included screws (slot-screw driver). Install the electrode / titration-tip holder as shown in Fig. 5.

Fig. 5 Installation of the stand rod

Fig. 6 Installation, lifting and lowering the electrode / titration-tip holder

3.4 Installing the burette tip

The burette tip consists of the elements shaft with threaded clamping joint, hose and slip-on tip.

Fig. 7 Disassembled burette tip:  Fig. 8 Assembled burette tip:

Burette tip - sequence of assembly:
1. Cut off hose end evenly.
2. Slip parts of the threaded clamping joint on to the hose Fig. 7.
4. Press burette tip onto the free hose end until it reaches the stop.
5. Push burette tip with pressed in hose onto the shaft.
6. Hold tip firmly, and screw threaded clamping joint to the shaft.
3.5 Connecting the manual key button and a printer / computer (PC)  
(spare parts)

Caution: The two sockets on the side of the unit are identical. If the sockets are mixed up, the electronics of the Piston Burette TITRONIC® basic may be damaged

Upper socket: manual key button, lower socket: printer / computer (PC).

3.6 Switching on and off

Connect the mains plug to the mains supply. The mains switch is located on the back panel of the Piston Burette TITRONIC® basic.

RS-232-C transmission parameters are fixed settings: 4800 baud, word length 7 bits, 2 stop bits, no parity.
4 Working with the Piston Burette TITRONIC® basic

In any titration process it has to be ensured that the intake hose is immersed into the titration solution in the storage bottle, so that the titration solution can be taken in without air bubbles. If the Piston Burette TITRONIC® basic is already filled with ready-to-use titration solution, titration can be started immediately.

If the Piston Burette TITRONIC® basic has to be filled first, the „Rinsing / Initial filling“ working sequence has to be initiated. The six steps will then run off automatically (Fig. 13). A receptacle with a capacity of at least 100 ml has to be positioned under the burette tip, since titration solution will be ejected during steps no. 2 and no. 4.

⚠️ Please note ⚠️: Please wear protective glasses and laboratory coat (and observe UVV 1 and UVV 113 (V GB) including implementation notes).

4.1 Rinsing and initial filling

Starting the function

Switch off Piston Burette TITRONIC® basic

Press grey key and hold depressed

Switch on Piston Burette TITRONIC® basic

Release key; rinsing / initial filling are running

To interrupt this function:

Press the grey key again.

Working steps

The following description illustrates the functioning of the Piston Burette TITRONIC® basic during „rinsing / initial filling“.

<table>
<thead>
<tr>
<th>Working step</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Taking in the titration solution</td>
</tr>
<tr>
<td>2</td>
<td>Dosing of the titration solution including the trapped air</td>
</tr>
<tr>
<td>3</td>
<td>Taking in the titration solution</td>
</tr>
<tr>
<td>4</td>
<td>Dosing of the titration solution in order to remove even the last air bubbles</td>
</tr>
<tr>
<td>5</td>
<td>Filling the piston burette</td>
</tr>
<tr>
<td>6</td>
<td>Ready for titration</td>
</tr>
</tbody>
</table>
4.2  Titration

**Normal titration**
Immerse the titration tip in the sample solution. This will increase accuracy.

Press the violet key to the first stage. The titration solution will be dosed until the key is held depressed.

The display shows the volume, the titration rate is approx. 9 ml per minute.

**0.01 ml - titration / stepwise titration**
Press shortly violet key (max. 0.3 s). 0.01 ml will be ejected each time the key is depressed again.

The display shows the volume.

**Fast titration / pretitration**
Press violet key fully (to second stage) and keep depressed.

The titration solution will be dosed as long as the key is being depressed.

The display shows the volume, the titration rate is approx. 24 ml per minute.
4.3 Result output and filling

**Result output / filling**
After pressing a key for the last time, wait at least for one second, then press the grey key for about 2 seconds. The Piston Burette TITRONIC® basic will be filled, the display will be set to 00.00 ml.

If a printer / computer (PC) is connected, the result will be transmitted in terms of ml (millilitres).

The piston burette will fill automatically if the volume of 20.00 ml has been ejaculated and titration is not yet completed. The volume will be added on the display.

**Setting the display to 00.00 / result output**
After pressing a key for the last time, wait at least for 1 second, then press the grey key twice in short intervals (0.3 sec. max.); the display will be set to 00.00 ml. If a printer / computer (PC) is connected, the result will be transmitted in terms of ml.

**Send intermediate result to the printer / computer (PC)**
After the last pressing of a key, wait at least one second, then press the grey key once (0.3 sec. max.), and the displayed volume will be sent in terms of ml to the printer/computer.

The displayed value remains on the display, titration can be continued.
5 Maintenance and care of the Piston Burette TITRONIC® basic

To retain the function of the Piston Burette TITRONIC® basic the following inspection and maintenance work are to be carried out.

Maintenance intervals

Normal operation:

嫌疑 As a rule, the max. intervals for carrying out all maintenance work are 3 months.

In the case of special load:

嫌疑 Special load is present if, for instance, solutions are used which are suitable to attack glass, e.g. solutions containing alkali, fluoride or phosphate, or if the average use exceeds 40 titrations per day.

嫌疑 Once per month, the dosing unit has to be inspected visually in order to check damages, and in addition a test according to DIN 12 650, Part 6 or Part 7, or ISO DIS 8655, Part 3, has to be carried out.

嫌疑 Once per quarter the electrical contacts (plugs, stirrer, manual key button) have to be inspected for corrosion, if the Piston Burette TITRONIC® basic is used in premises with an occasional occurrence of corrosive matters in their atmosphere.

嫌疑 If there is suspicion that a solution is attacking the glass excessively, the maintenance intervals are to be reduced accordingly.

In case of disturbances:

嫌疑 If a disturbance, a malfunction or another defect becomes obvious, the maintenance work has to be carried out immediately.

嫌疑 If it has to be assumed that safe operation is no longer possible, please refer to chapter 1 “Warning and safety information”.

Maintenance work to be carried out

嫌疑 Check whether humidity has penetrated below the dosing unit. To do so remove the dosing unit (chapter 3, Fig. 1 to 4 resp. Fig. 7 to 10). If humidity can actually be found there, one can conclude that the piston in the cylinder is no longer tight.

嫌疑 Check the hoses, the threaded connections and the seals for visible damage, contamination and leakage. Installation of the screw connections Fig. 11.

嫌疑 Check the electrical plug-in contacts for corrosion and mechanical damage.

嫌疑 Defective parts have to be repaired or replaced by new parts. Defective glass parts have to be replaced in any case.

After each maintenance process the measurement-technical reliability according to DIN 12 650, Part 6 or Part 7, or ISO DIS 8 655, Part 3, has to be verified.

The measurement-technical reliability - including maintenance - is offered by SCHOTT-GERÄTE upon request (including manufacturer’s certificate, if requested). For this purpose the titration unit has to be sent to SCHOTT-GERÄTE.

Use interruptions

嫌疑 If the Piston Burette TITRONIC® basic is not being used over a longer period of time, the liquids contained in the system have to be removed, and the titration unit has to be flushed out with distilled water. If the liquid is left in the system, one has to reckon with corrosion and an alteration of solutions used over the time. Since the state of the art does not provide plastic hoses which are absolutely free of diffusion occurrences, these precaution measures apply in particular to the hose-line section.

Cleaning

嫌疑 The Piston Burette TITRONIC® basic can be cleaned using a moist piece of cloth with normal household cleaning agents.

嫌疑 The bottom and rear side have to be treated dry. In no case must liquid penetrate into the interior of the Piston Burette TITRONIC® basic.
6 Replacing the dosing unit (installation and dissambly)

As a rule, the need for replacing the dosing unit occurs only rarely. The dosing unit has to be replaced, if such a replacement becomes necessary as a result of a defect or of an inspection of the titration unit.

The dosing unit is equipped with lateral ribs around its circumference, with one of these ribs being in double design. This double rib serves as a mark for the correct placement of the dosing unit (Fig. 3, Pos. 2 resp. Fig. 9, Pos. 2).

Important note: The disassembly of the dosing unit as such is only possible using a special tool (TZ 3630) and should only be done by experienced persons. The sealing lip of the PTFE piston and the sealings of the liquid system may be damaged or incorrectly positioned in the course of such a disassembly. As a result, titration liquid would leak in unwanted places.

Caution! Wear protective glasses!

Switch the Piston Burette TITRONIC® basic on (Fig. 8 of the Operating Instructions)
Press the violet key of the manual key button, dose until the display shows between 18.00 and 19.00 ml.
Switch the Piston Burette TITRONIC® basic off.
Unlock the dosing unit by rotating it to the left (anticlockwise, Fig. 1).
Keep both keys of the manual key button depressed (Fig. 5 + Fig. 6), furthermore switch the titration unit on. (This somewhat awkward way of proceeding is necessary in order to prevent the inadvertent start of the process under all circumstances).
The motor of the Piston Burette TITRONIC® basic will automatically move the piston rod up. The display will show <<uP>>.

The process is completed as soon as the display shows <<End>>, the dosing unit can be removed (Fig. 2).
Switch the Piston Burette TITRONIC® basic off.

Set on new (inspected, if necessary repaired) dosing unit vertically. When doing so the „M“ double rib (Fig. 3) must point at the position 2 of the casing marking. Subsequently, switch the Piston Burette TITRONIC® basic on. The running motor will now pull the dosing unit downwards.
As soon as the dosing unit moving downwards has reached the edge of the casing, the Piston Burette TITRONIC® basic has to be switched off, and the dosing unit has to be locked manually (Fig. 4). In order to fill the Piston Burette TITRONIC® basic with titration solution, proceed as it is described in chapter 3.1 „Rinsing / Initial filling“ of the Operating Instructions (Fig. 9 and 10).
6.1 Replacing the titration solution

If titration solutions are to be changed, since differing analysis methods are used, one should first consider whether the time required for frequent changes is not more expensive than the acquisition of another dosing unit.

As a principle and in the case of all piston burette systems, a substitution of the titration solution by another one involves mixing and carry-over processes. The reason for this is the dead volume above the piston in the cylinder and in the hoses. The disturbances to be anticipated are the greater, the more the new solution differs from the previous type and concentration. In the case of highly different solutions, the first substitution liquid (rinsing) should be distilled water, and the new titration solution should be filled in only subsequently.

The possible disturbances are very much different in the individual cases and cannot be predicted without knowledge of the specific case. Therefore the replacement of titration solutions must always be performed under the supervision of experts who ensure the correctness of the future analyses.

If the decision to change the titration solution has been made, the first thing to do is to remove the dosing unit as it is described in chapters 3.1 or 3.2, respectively. If possible, the residue of the titration solution should be removed by hand by carefully pushing the projecting piston rod towards the hoses. When doing so, more liquid will leak out of the titration tip, and the residual volume is furthermore reduced. Removing the old titration solution can be accelerated by moving the piston rod of the dosing unit positioned top down. The suction hose is then immersed in the new solution or in water as intermediate liquid. By moving the piston several times in both directions (pumping) the previous liquid is gradually replaced by new liquid. Subsequently, the dosing unit is set on again according to the description in chapter 3.1 and 3.2.

7 Storage, transportation and environment

If the titration units are to be stored temporarily or transported, the best solution to protect the devices is to use the original packing. In many cases the original packing will no longer be available, so that an alternative packing has to be put together. Welding the titration units in a foil is an advantageous solution. Prior to this it has to be made sure that no liquid is left in the dosing unit.

If the titration unit is to be sent to a service shop, it is necessary to indicate the titration solution last used on the accompanying documents or on the piston burette. Otherwise the service shop will dispose of the parts damaged or to be replaced as special waste at the charge of the customer.

The room selected for storage should provide the following conditions:
- temperature between +10 and +40 °C for operation and storage,
- humidity according to EN 61 010, Part 1:
  - maximal relative humidity 80 % for temperatures up to 31 °C,
  - linear decrease down to 50 % relative humidity at a temperature of 40 °C.

Although you will use your titration device for a very long time, so that the following information comes far too early: But if your system has reached the end of its life, please observe the regulations applicable for your land and town as to its disposal.
8 Elimination of disturbances

The display does not respond to keys being pressed, the display is dark.

<table>
<thead>
<tr>
<th>Internal program is disturbed (e.g. by electrostatic loading or mains overvoltage)</th>
<th>Switch the device off, and switch it on again after 10 seconds.</th>
</tr>
</thead>
</table>

The stirrer does not work.

<table>
<thead>
<tr>
<th>Connection contacts are dirty.</th>
<th>Clean contacts.</th>
</tr>
</thead>
</table>

The dosing unit is not properly filled.

<table>
<thead>
<tr>
<th>Dosing bottle is empty.</th>
<th>Replace or refill the reagent bottle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hose is not immersed deeply enough in the reagent bottle.</td>
<td>Immerse the hose deeper in the bottle, or fill up reagents.</td>
</tr>
<tr>
<td>Dosing unit is not properly locked.</td>
<td>Lock the dosing unit by a quarter rotation at the lower position.</td>
</tr>
</tbody>
</table>

Air bubbles in the titration system

<table>
<thead>
<tr>
<th>Valve is defective.</th>
<th>Replace dosing unit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hose connections are not tight.</td>
<td>Check: Has the hose been pulled out of threaded connection? Screw hose manually on. Replace hoses including threaded connections.</td>
</tr>
</tbody>
</table>

The titration tip leaks after use.

<table>
<thead>
<tr>
<th>Dirty valve does not close.</th>
<th>Flush dosing unit, replace solution.</th>
</tr>
</thead>
</table>

When setting on a new dosing unit, the piston rod is not properly pulled in, the device rattles.

<table>
<thead>
<tr>
<th>Inclined piston rod.</th>
<th>Set on piston rod vertically again.</th>
</tr>
</thead>
</table>

Titration solution is not titrated / dosed.

<table>
<thead>
<tr>
<th>Dosing unit is not properly filled.</th>
<th>Perform initial filling.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosing unit is not properly locked.</td>
<td>Lock dosing unit in the lower position by a quarter rotation to the right (Fig. 4 or Fig. 10).</td>
</tr>
<tr>
<td>Hose or titration tip are wrinkled or blocked.</td>
<td>Check clear passage through hose and titration tip, replace if necessary.</td>
</tr>
<tr>
<td>System contains air bubbles.</td>
<td>Please refer to „Air bubbles in the dosing system“.</td>
</tr>
<tr>
<td>Undissolved parts in the titration solution.</td>
<td>Filter or replace titration solution.</td>
</tr>
<tr>
<td>Hoses of the dosing unit were mixed up when screwed on.</td>
<td>Change hose thread connections: The slightly higher valve leads to the titration tip.</td>
</tr>
</tbody>
</table>

The data transfer to the printer / computer does not work.

<table>
<thead>
<tr>
<th>Set transfer parameters properly.</th>
<th>Settings: 4800 baud, 7 data bits, no parity, no handshake.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you using a suitable cable?</td>
<td>Use a TZ 3095 for the printer or a TZ 3096 / 3097 for the PC.</td>
</tr>
<tr>
<td>Are the cables properly connected?</td>
<td>The lower socket is the RS-232-C interface. Check cable connection, are the screws on the PC side tightened? PC: „COM 1“ and „COM 2“ possibly were mixed up!</td>
</tr>
<tr>
<td>Defective cable.</td>
<td>Replace cable.</td>
</tr>
<tr>
<td>Malfunction of printer / computer.</td>
<td>Switch the devices off, switch them on again after 10 seconds.</td>
</tr>
</tbody>
</table>
9 Accessories and spare parts

Accessories

TZ 2008 bottle set-on unit with S 40 thread for reagent bottles, e.g. Merck make
TZ 2005 bottle set-on unit with GL 45 thread for reagent bottles, e.g. Riedel-de Haén, Schott make
TZ 3025 TM 96 Stirrer with PTFE stirring rod
TZ 3095 1.5 m data cable RS-232-C with plug for printer connection:
   1. side: 4-channel mini DIN plug
   2. side: 25-channel sub-Miniature-D plug
TZ 3096 1.5 m data cable RS-232-C for computer (PC) with 25-channel plug:
   1. side: 4-channel mini DIN plug
   2. side: 25-channel sub-Miniature-D plug
TZ 3097 1.5 m data cable RS-232-C for computer (PC) with 9-channel plug:
   1. side: 4-channel mini DIN plug
   2. side: 9-channel sub-Miniature socket
TZ 3098 data cable set:
   1.5 m data cable RS-232-C: 1. side: 4-channel mini DIN plug
   2. side: 9-channel sub-Miniature-D socket
   Adapter: 9-channel plug → 25-channel socket
TZ 3460 printer with RS-232-C interface, including 1.5 m TZ 3095 printer cable

Spare parts

TZ 3000 valve
TZ 3280 hose set
TZ 3630 mounting wrench
TZ 3660 electrode / titration-tip holder
TZ 3665 stand rod
TZ 3680 manual key button
TZ 3130 dosing unit 20 ml, complete assembly