

EQ

EP

ppm H₂O

ml

EQ

TITRONIC® and TitroLine

Precise dosing, manual and automatic titration
Water analysis according to Karl Fischer – it's so easy



EP

ppm H₂O

ml

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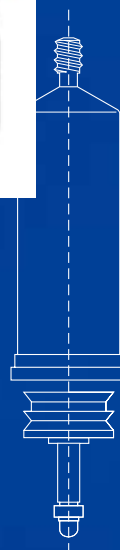
ml

EQ

EP

ppm H₂O

ml



Dosing, titrating and water analysis according to Karl Fischer can be so easy

Innovative electrochemistry – right from the start

With the development of the glass electrode more than 65 years ago, Schott created the basis for the success of electrochemical measurement. Since then, with our range of efficient pH glasses, innovative electrodes and instruments such as pH meters, conductometers, oxygen measuring instruments, we have turned the electrochemical measurement into an indispensable, trouble-free and reliable procedure that is now being used throughout the world.

Building on this know-how, we have also developed a range of reliable laboratory instruments for dosing, titrating and Karl Fischer water analysis.

These instruments combine ease of use with maximum accuracy, and the robustness required for daily operation in the laboratory. Benefits, which far outweigh the cost of these instruments.

For complex application such as difficult, nonaqueous titrations and for automatic measuring stations, the Schott TitroLine alpha *plus* titration system is also available. Please ask for our separate **TitroLine alpha plus** brochure or visit our Internet pages at: www.schott.com/labinstruments.

Just what you need to improve your routine daily work

Like the TitroLine *easy* and TitroLine *KF* titrators, the TITRONIC® *basic* and TITRONIC® *universal* piston burettes are robust tools for dosing and titrating, which were designed specifically for daily routine use in the laboratory. In addition to their robustness, these are high precision instruments. Even the simplest burette is equipped with an UV-protected precision glass cylinder made of DURAN® and a motor-controlled 3/2-way valve made of extremely resistant PTFE/ETFE. We have also focussed our attention on the importance of easy, trouble-free operation – so a manual is something you may never need to use.



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TITRONIC® basic

The burette with the ›Mouse‹

Anyone with a TITRONIC® basic in the laboratory will leave their bottle-top burettes and classic glass burettes on the shelf. Manual titration can be performed more reliably and accurately with the TITRONIC® basic, and the results can be documented when required.

Operation is so easy

The titration process is carried out by pressing a button on the ›mouse‹ – the handheld device TZ 3680. You can monitor the dosed quantity conveniently on the large display. The TITRONIC® basic is equipped with an RS-232-C serial interface so that you can document your results. Here, for example, you can also connect our small, practical TZ 3460 rollpaper printer or any other printer with a serial RS-232-C interface. Needless to say, you can also connect your PC to the TITRONIC® basic.

Precision is integrated

The accuracy of the TITRONIC® basic is guaranteed by the precision glass cylinder made of DURAN® borosilicate glass with its measurement deviation of less than 0.1 %. The motor-driven, chemically resistant 3/2-way valve also provides its contribution to precise, reproducible values: It enables unpressurised drawing and dosing and therefore effectively prevents outgassing of liquids and vapour formation due to excessive vacuum pressure.

The magnetic stirrer is available as an accessory

The TM 96 magnetic stirrer is available as an accessory. It is connected directly to the burette, which provides the necessary power.



The complete workplace: precision analysis with no shaky compromises. With 8000-step resolution, precision glass cylinder with UV-protection, motor-controlled 3/2-way valve of extremely resistant PTFE/ETFE and an interface for documentation of the results. It's better to be on the safe side! (The bottle set must be ordered separately as an accessory.)

Technical data

Hand control element	miniature 4 pole round socket, conforming to DIN standards
RS-232-C	for connecting a printer with serial interface or PC for documentation
Display	four digit LCD display, 20 x 48 mm, height of digits: 12.7 mm
Volume display	0.01 ... 999.9 ml
Resolution	0.01 ml
Cylinder	20 ml DURAN® borosilicate glass cylinder with UV protection sleeve
Hoses	FEP with UV protection
Dosing accuracy	systematic error 0.1 %, random error 0.05 %, determined according to EN ISO 8655-6
Valve	3/2-port directional control valve made of PTFE/ETFE
Housing material	Polypropylene and Polyflamm RPP 371 NT, 20 % talcum
Front foil	Polyester
Dimensions	135 x 310 x 205 mm (W x H x D), including dosing unit, without stirrer
Weight	approx. 2,1 kg
Ambient temperature	+10 ... +40 °C (for operation and storage)
Power supply	230 V~; 50/60 Hz or 115 V~; 50/60 Hz
Appliance safety	corresponds to Protection Class II in accordance with DIN EN 61010, part 1
Conformity	EN ISO 8655-3

TITRONIC® *universal*

Titration manually, dosing perfectly

The TITRONIC® *universal* is a perfect motor-driven burette for manual titration and an extremely precise dosing instrument for dosable liquids, solvents and titrating agents. However, the TITRONIC® *universal* not only first-rate as a stand-alone instrument – it also thrives as the heart of a computer-controlled dosing or titrating system.

Adjusting easily, dosing precisely

With the TITRONIC® *universal* you can preselect any dosing volume from 0.01 ml to 999.99 ml with the keypad and you can adjust the dosing speed to a continuously controllable setting. Furthermore, with the TITRONIC® *universal* you can define the waiting time between the volume steps, a useful tool for incremental dosing tasks. The dosing process is carried out precisely on command. This, by the way, is also extremely practical for manual titration with the hand-held device: Using a precisely adjusting pre-titrating volume, which can be called up at the press of a button before each titration, you can reduce your titration times considerably.

Documenting results reliably

To document your results, simply connect our small, practical TZ 3460 rollpaper printer or any other printer with a serial RS-232-C interface.

The TITRONIC® *universal* gets on quite well with the PC

We have equipped the TITRONIC® *universal* with **two** serial RS-232-C interfaces. This allows you to not only connect a printer in order to document data in the stand-alone mode, but also extends the available range of use of the TITRONIC® *universal* quite considerably. For instance, you can use a PC to control all func-

tions of the TITRONIC® *universal* via one of the two serial interfaces. The address is set automatically or manually. But the TITRONIC® *universal* can do a lot more: For complex dosing and titrating processes, up to 16 burettes can be connected in series whenever required. The burettes are connected to one another via the RS-232-C interfaces according to the daisy chain principle. Accordingly, each instrument can then be addressed separately and provides independent feedback data – without an additional data cable.



Technical data

Designed for maximum precision

All components of the TITRONIC® *universal* are designed for maximum precision. This begins with the dosing attachments, which are available in 20-ml or 50-ml volumes. The glass cylinders made of DURAN® borosilicate glass are precisely calibrated and provided with an UV protective coating. The dosing piston is driven by a step motor with a resolution of 8,000 steps. The motor-controlled 3/2-way valve is made of extremely resistant PTFE/ETFE. This 3/2-way valve enables unpressurised drawing and dosing to prevent outgassing of liquids and vapour formation due to excessive vacuum pressure.

Made for robust laboratory operation

All parts of the TITRONIC® *universal* which come into contact with liquids are made of chemically resistant materials. A polyester front foil protects the keypad and display, and the tubing is in FEP with UV protection.

The magnetic stirrer is available as an accessory

The TM 96 magnetic stirrer is available as an accessory. It is connected directly to the burette, which provides the necessary power.

Keyboard connection	miniature 4 pole round socket, conforming to DIN standards
Stirrer connection	plug-and-socket connection with integrated low-voltage power supply (15 V DC) for the TM 96 magnetic stirrer low-voltage power supply (15 V DC) for the TM 96 magnetic stirrer
RS-232-C-1	for connecting a printer with serial interface or a PC to document and consumption in ml or for data backup
RS-232-C-2	connection of additional piston burettes TITRONIC® <i>universal</i> ('Daisy Chain')
Configuration of the RS-232-C interface	connection: miniature 4 pole round socket preset: 1 stop bit adjustable: baud rate: 1200, 2400, 4800 or 9600 baud word length: 7 or 8; parity: no, even or odd; address 00 ... 15
Display	8-line LCD display, 69 x 39 mm, 64 x 128 pixel, with background illumination and contrast adjustment
Volume display	00.00 ... 999.9 ml
Display resolution	0.01 ml
Dosing volume	0.0 ... 999.99 ml
Dosing speed	0.1 ... 40 ml/min (with 20 ml dosing unit) 0.1 ... 100 ml/min (with 50 ml dosing unit)
Filling time	30 s to 999 s adjustable (100% in relation to the cylinder volume)
Pre-titrating volume	0.1 ml to 99.99 ml
Increment volume	0.01 ... 999.99 ml
Waiting time between the increments	0.1 ... 999.9 s
Cylinder	20 ml or 50 ml DURAN® borosilicate glass cylinder with UV protection sleeve
Dosing accuracy	systematic error 0,1 %, random error 0,05 %, determined according to EN ISO 8655-6
Valve	3/2-port directional control valve made of PTFE / ETFE
Hoses	FEP with UV protection
Housing material	Polypropylen and Polyflamm RPP371 NT, 20% talcum
Front foil	Polyester
Dimensions	134 x 310 x 205 mm (W x H x D), including dosing unit, without stirrer
Weight	approx. 2.1 kg
Ambient temperature	+10 ... +40 °C (for operation and storage)
Power supply	230 V~; 50/60 Hz or 115 V~; 50/60 Hz
Power consumption	18 VA
Conformity	EN ISO 8655, part 3

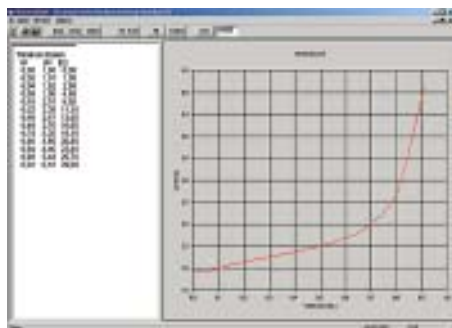
With the TITRONIC® *universal* in the stand-alone mode, you can use the keypad to input all settings conveniently on the instrument. The practical hand-held device can be used for manual titrations or to start and stop a dosing task. (The bottle set must be ordered separately as an accessory.)

TitroLine *easy*

The intelligent titrator for your routine daily work

Quick and easy as its name suggests

The TitroLine *easy* is the ideal titrator for your routine daily work. This instrument provides you with the perfect combination of a piston burette, a pH/mV meter and integrated intelligence. Ten titration methods for various applications are pre-installed and can be called up easily as required. The methods are pre-parameterised. You only need to select your titration procedure: with a self-searching end point, with a pre-set end point, or manual titration with the »mouse«. The titration process begins as soon as you press the start button. This saves you time and money.



With the TitroLine Chart software (option), the titration curve can be displayed on the monitor of a connected PC and the titration data can be processed.

Practical and compact: A complete measuring unit. The magnetic stirrer is included and is connected to the TitroLine *easy*. The bottle set must be ordered separately as an accessory.

Suitable applications for the TitroLine *easy* include:

- salt content in foods (cheese, soya sauce, ketchup)
- total acid in wine and beverages
- nitrogen according to Kjeldahl
- degree of acidity in bread and sourdough
- acid capacity (m-value)
- chloride in drinking water
- iodometric titrations
- titration of acids and alkaline solutions, general
- redox titrations, general

Technical data

easy



Measuring amplifier	measuring input pH/mV electrode: pH-input with 12-bit converter for highly accurate resolution of the measuring signal during titration measuring range pH: 0.00 ... 14.00 measuring range mV: -1400 ... +1400 electrode socket according to DIN 19262 or BNC-socket and reference electrode 1 x 4 mm measuring input temperature sensor Pt 1000, measuring range: -30 ... +115 °C connection socket 2 x 4 mm and 1 x 2 mm
Keyboard connection	miniature 4 pole round socket, conforming to DIN standards
Stirrer connection	plug-and-socket connection with integrated low-voltage power supply (15 V DC) for the magnetic stirrer TM 96
RS-232-C interface	for connecting a printer with serial interface or PC for documentation
Configuration of the RS-232-C interface	preset: 4800 baud, 8-bit word length, 2 stop bits, no parity
Display	matrix-LCD display 69 x 39 mm, 64 x 128 Pixel background illumination and contrast adjustment
Volume display	00.00 ... 999.9 ml
Display resolution	0.01 ml
Cylinder	20 ml DURAN® borosilicate glass cylinder with UV protection
Dosing accuracy	systematic error 0.1 %, random error 0.05 % determined according to EN ISO 8655-6
Calibration	two-point calibration, selection of eight stored buffer solutions in conformity with DIN 19 266 and NBS
Valve	3/2-port directional control valve made of PTFE / ETFE
Hoses	FEP with UV protection
Housing material	Polypropylene and Polyflamm RPP 371 NT, 20 % talcum
Front foil	Polyester
Dimensions	135 x 310 x 205 mm (W x H x D), including dosing unit, without stirrer
Weight	approx. 2,4 kg
Ambient temperature	+10 ... +40 °C (for operation and storage)
Power supply	230 V~; 50/60 Hz or 115 V~; 50/60 Hz
Power consumption	24 VA
Appliance safety	corresponds to Protection Class II in accordance with DIN EN 61 010, Part 1
Conformity	EN ISO 8655, part 3

The sensors – from Schott of course

Suitable sensors include pH combination electrodes with or without integrated temperature sensors (Pt 1000), redox combination electrodes, Ag combination electrodes or separate measuring or reference electrodes.

Stored data: the buffer solutions

Data for 2.00/4.00/4.01/6.87/7.00/9.18/10.00/12.45 buffers, including temperature coefficients are already stored in the TitroLine *easy*.

Maximum precision for reproducible results

All components of the TitroLine *easy* are designed for maximum accuracy. The glass cylinders made of DURAN® borosilicate glass are precisely calibrated and provided with an UV protective coating. The motor-controlled 3/2-way valve is made of extremely resistant PTFE/ETFE. This 3/2-way valve enables unpressurised drawing and dosing to prevent outgassing of liquids and vapour formation due to excessive vacuum pressure.

As robust as required for laboratory operation

All parts of the TitroLine *easy* that come into contact with liquids are made of chemically resistant materials. A polyester front foil protects the keypad and display, and the tubing is in FEP with UV protection.

TitroLine KF

The dialogue mode: volumetric water analysis in simple steps!

Karl Fischer titrations easily performed

Practically nothing can go wrong when you use the TitroLine KF for water analysis according to the Karl Fischer titration procedure: Each step in the analysis is prompted in a dialogue on the large display. The pre-parameterized methods can be called up easily and will facilitate your work. The versatility of the TitroLine KF makes it an ideal choice for KF analysis in the pharmaceutical, chemical, food, and mineral oil industries.

Easy – with methods

The TitroLine KF is already programmed with the following methods ready for you to use: sample titration, water titre, liquid standard titre, tartrate dihydrate titre, oven blank value and solvent blank value. All methods stored in the TitroLine KF are pre-assigned with the commonly used parameters. You can, however, change these parameters as required.

We are always glad to help you with your applications

The staff in our application laboratory are pleased to advise and assist you and will place the know-how they have gained through many years of practical work with KF titrations at your disposal. The application manual 'KF Titration in Practical Applications', which is enclosed with the TitroLine KF, puts some of this experience at your disposal. You will also find further applications in our application database at our Internet web site (www.schott.com/labinstruments) where application data can be downloaded.



The TitroLine KF includes everything you need for water analysis according to Karl Fischer. The scope of supply includes the titrator, reagent bottle, titration stand TM KF, titration vessel, electrode and a starter kit (6 syringes with tubular needles, molecular sieve and three ampoules with a water standard specification). The waterproof mini keyboard TZ 2825 is available as an optional extra.



Adaptable for all sample types

For samples with very high water content, a specific **pre-titration volume** can be added in a single step at the start of the analysis to accelerate the titration process.

With the **extraction time** function, the start of the titration process can be delayed until the sample has dissolved or the water content has been extracted. As a criterion to end such titrations, a choice can be made between **drift stop** and the traditional **end point delay**.

The variation of the shutdown current and the **pole voltage** being applied enables proper adaptation to any solvent. For applications with the KF oven, the **max. titration period** is more suitable than the shutdown time or the drift stop.

For samples that only release water with difficulty, the **min. titration period** enables simultaneous extraction of the water during the titration.

Titration stand TM KF

At the press of a button used titration samples are drawn off by the titration stand TM KF. You can then place fresh solvent into the system by pressing another key. An integrated magnetic stirrer in the TM KF ensures even distribution of the solvent and sample.



The seals on the titration vessel avoid moisture penetration to a minimum (minimum drift!). The removable glass vessel is available in two sizes and is easy to clean.

KF

The TitroLine *KF* – also an example of good laboratory practical work

Automatic selection of the correct calculation formula

Two different formulas may be used to calculate the result of a Karl Fischer titration. When choosing the method, the correct formula is automatically selected and pre-assigned with the corresponding values. Measurement units for the result can be selected from %, ppm, mg, mg/l, mg/pc (pc = piece) and ml. The titre is always shown in mg/ml, and the blank value in ml.

Quality assessment with statistics

For a statistical evaluation of the analysis, the mean value, standard deviation and the relative standard deviation can be determined. The mean value of the titre and of the blank value is the automatic reference for the calculation of the sample result.

Documentation – exactly the way you need it

To document your results, you can connect a printer, such as the TZ 3460, to one of the two RS-232-C interfaces. For documentation of your results, you can choose to print the results in standard, brief or GLP form. The GLP documentation includes the consumption, result, statistics, originally weighed quantity/submitted quantity, date, time, sample ID, titre, blank value, drift, titration period, method used, titration parameter, calculation formula with values used and an addition input field for the user.



Using your PC and the titration software ›KF-Soft‹, you can also display your KF titrations as curves. All results can be reliably documented in the database integrated in the PC and retrieved at will.

Sample labelling with a keyboard

Sample IDs can be entered using the external, protected keyboard TZ 2825 (optional). Alternatively, the PC keyboard TZ 2835, which is available as an accessory, or any other PC keyboard with a DIN plug can be connected.

We will support your instrument qualification

Within the framework of quality management systems, the traceability of analysis results is becoming increasingly important. We will gladly help you with a logbook that will provide you with the form sheets for the **IQ** (Installation Qualification), **OQ** (Operational Qualification) and **PQ** (Performance Qualification) qualifications. Using the logbook, the commissioning, routine work and verification of the TitroLine *KF* can be efficiently documented.

Technical data

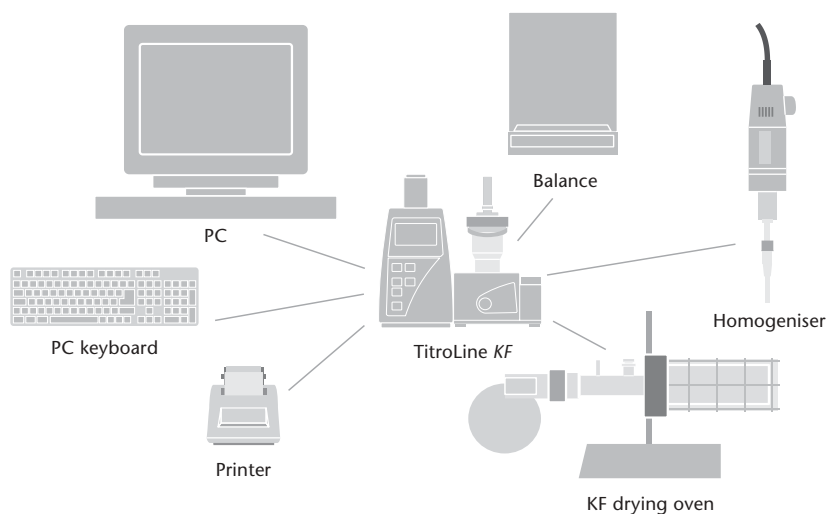


Dosing accuracy	systematic error 0.1 %; random error 0.05 %; determined according to EN ISO 8655-6
Display	matrix LCD 69 x 39 mm, 64 x 128 pixels with background illumination, contrast adjustable
Electrode	connection for double platinum electrode; output voltage 100 mV, adjustable between 5 ... 200 mV by means of software; connection: 2 x 4 mm socket
Keyboard	5-pole DIN socket for TZ 2825 and PC keyboards with DIN plug
RS-232-C interfaces	two bidirectional RS-232-C interfaces for PC/printer and balance/appliances
Cylinder	20 ml made of DURAN® (borosilicate glass 3.3)
Valve	3/2-port directional control valve made of PTFE / ETFE
Hoses	FEP with UV protection
Housing material	Polypropylene and Polyflamm RPP 371 NT, 20 % talcum
Front foil	Polyester
Dimensions	310 x 265 x 205 mm (H x W x D) with titration stand TM KF and titration vessel, 310 x 135 x 205 mm (H x W x D) height including of dosing unit (without titration stand)
Weight	approx. 3.2 kg for complete appliance with titration stand; approx. 2.1 kg for basic appliance
Ambient temperature	+10...+40 °C (for operation and storage)
Power supply	230 V~, 50/60 Hz or 115 V~, 50/60 Hz
Power consumption	30 VA
Conformity	EN ISO 8655, part 3

Precise and robust

All components of the TitroLine *KF* are designed for maximum accuracy. The glass cylinders made of DURAN® borosilicate glass are precisely calibrated and provided with an UV protective coating. The dosing piston is driven by a step motor with a resolution of 8,000 steps. The motor-controlled 3/2-way valve is made of extremely resistant PTFE/ETFE.

All parts of the TitroLine *KF* that come into contact with liquids are made of chemically resistant materials. A polyester front foil protects the keyboard and display, and the tubing is in FEP with UV protection.



Connections and PC control

The TitroLine *KF* is equipped with two RS-232-C interfaces. This, for example, will allow you to connect a balance for automatic transfer of the weighing data and a printer at the same time. Instead of the printer, you can connect a PC and use the titration software *KF-Soft* to document your data reliably, to store your data in the integrated database or to retrieve and process your data as required.

Ordering information

TITRONIC® *basic* and TITRONIC® *universal*

	Order no.
TITRONIC® <i>basic</i> module 1, (230 V)	285212572
TITRONIC® <i>basic</i> module 2, same as module 1, with magnetic stirrer TM 96, (230 V)	285212823
TITRONIC® <i>universal</i> 20 ml module 1, (230 V)	285212429
TITRONIC® <i>universal</i> 20 ml module 2, same as module 1, with magnetic stirrer TM 96, (230 V)	285212437
TITRONIC® <i>universal</i> 50 ml module 1, (230 V)	285212445
TITRONIC® <i>universal</i> 50 ml module 2, same as module 1, with magnetic stirrer TM 96, (230 V)	285212494
TITRONIC® <i>basic</i> module 1, (115 V)	285212564
TITRONIC® <i>basic</i> module 2, same as module 1, with magnetic stirrer TM 96, (115 V)	285212815
TITRONIC® <i>universal</i> 20 ml module 1, (115 V)	285211921
TITRONIC® <i>universal</i> 20 ml module 2, same as module 1, with magnetic stirrer TM 96, (115 V)	285211962
TITRONIC® <i>universal</i> 50 ml module 1, (115 V)	285211979
TITRONIC® <i>universal</i> 50 ml module 2, same as module 1, with magnetic stirrer TM 96, (115 V)	285211987

TitroLine *easy*

TitroLine <i>easy</i> module 1 without electrode, (230 V)	285212597
TitroLine <i>easy</i> module 2 for pH titration, same as module 1, with one pH-electrode and buffer set, (230 V)	285212848
TitroLine <i>easy</i> module 3 for halogenide titration, same as module 1, with one silver combination electrode, (230 V)	285212864
TitroLine <i>easy</i> module 1 without electrode, (115 V)	285212589
TitroLine <i>easy</i> module 2 for pH titration, same as module 1, with one pH-electrode and buffer set, (115 V)	285212831
TitroLine <i>easy</i> module 3 for halogenide titration, same as module 1, with one silver combination electrode, (115 V)	285212856

TitroLine *KF*

TitroLine <i>KF</i> , complete, (230 V)	285212248
TitroLine <i>KF</i> , complete, (115 V)	285212231

Accessories for TITRONIC® *basic*, TITRONIC® *universal*, TitroLine *easy* and TitroLine *KF*

TZ 2005, bottle top adapter, GL 45	285221055
TZ 2008, bottle top adapter, S 40	285221088
TZ 2007, bottle top adapter GL 45, with 1 L reagent bottle, clear	285221071
TZ 2004, bottle top adapter GL 45, with 1 L reagent bottle, brown	285221047
TZ 3460, RS 232 printer including data cable, (230 V)	285225608
TZ 2825, mini PC keyboard (only TitroLine <i>KF</i>)	285212753
TZ 1052, KF drying oven, (230 V)	285214721
TZ 1050, accessory for KF drying oven	285218107
TZ 2073, KF-Soft for TitroLine <i>KF</i>	285221733
TZ 2074, TitroLine Chart for TitroLine <i>easy</i>	1015738

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