

Laboratory and Portable Meters

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick 



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Laboratory Meters

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Selection Matrix

Selection matrix

		Portable battery meters								Laboratory meters				
		pH measurement				Conductivity meas.				DO meas.		pH meas.	Cond.	
		913 X pH	913 pH	911 X pH	911 pH	913 X Cond	913 Cond	911 X Cond	911 Cond	913 Oxy	911 Oxy	765	766	703
Process variables	mV/ORP measurement	■	■	■	■							■	■	
	Conductivity measurement					■	■	■	■					■
	Salinity determination					■	■	■	■					
	TDS determination					■	■	■	■					
	Dissolved oxygen measurement									■	■			
	Temperature measurement/compensation	■	■	■	■	■	■	■	■	■	■	■	■	■
	Pressure compensation									■	■			
Functions and features	Documentation to GLP/ISO 9000	■	■			■	■			■		■		■
	PC interface	■	■			■	■			■		■		■
	PC software included	■	■			■	■			■				
	Printer control directly from the meter	■	■			■	■			■		■		■
	Data memory	■	■			■	■			■				
	Data logger	■	■			■	■			■				
	Date/clock function	■	■			■	■			■		■		■
	Automatic self-test	■	■	■	■	■	■	■	■	■	■	■	■	■
	Zone 1(0) application	■		■		■		■						
	Calimatic® automatic calibration	■	■	■	■							■	■	
	Automatic temp probe recognition	■	■	■	■	■	■	■	■	■	■	■	■	■
	Sensoface® information on sensor status	■	■	■	■	■	■	■	■	■	■	■	■	■
	Simultaneous display of primary value and temp	■	■	■	■	■	■	■	■	■	■	■	■	■
	Trueline® analog recorder output											■	■	■
	Sensor statistics											■		
	Water-proof to IP 66	■	■	■	■	■	■	■	■	■	■			
	Protective cover with short instructions	■	■	■	■	■	■	■	■	■	■			
Auto switch-off	■	■	■	■	■	■	■	■	■	■				
Accessories	Field case	■	■	■	■	■	■	■	■	■				
	Matrix printer	■	■			■	■			■		■		■
	Attachable stand with stirrer control										■	■	■	
	Immersion stirrer										■	■	■	
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Overview of Product Types

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

Knick

Perfection as a program.

For mobile liquid measurement, Knick has developed the pioneering Portamess® Series for pH value, conductivity and saturation. In addition to a basic unit, a unit with real-time clock, data storage, and interface to PC is provided for each process variable.

Knick laboratory meters are available for pH and conductivity measurement. They stand for safety, reliable workmanship, and easy handling. No other pH meter is as easy to operate as the Knick Model 766 Laboratory pH Meter. The meter monitors itself as well as the pH sensor. Calibration is performed automatically using Knick Calimatic®.

Portable Meters

Portamess 913 (X) pH

High-quality, portable pH meter with data logger and interface for printer and PC.



Portamess 911 (X) pH

Basic unit for mobile high-precision pH measurement.

Portamess 913 (X) Cond

High-quality, portable conductivity meter with data logger and interface for printer and PC.



Portamess 911 (X) Cond

Basic unit for mobile high-precision conductivity measurement.

Portamess 913 Oxy

High-quality, portable dissolved-oxygen meter with data logger and interface for printer and PC.



Portamess 911 Oxy

Basic unit for mobile high-precision oxygen measurement.

Laboratory Meters

765 Laboratory pH Meter

with RS-232 interface and all features for ISO 9000 documentation.

766 Laboratory pH Meter

Standard pH meter for all applications in everyday lab routines.

703 Laboratory Conductivity Meter

for conductivity measurements with highest demands.



State of the Art

Knick >

The company



The Company

For over 50 years, the name Knick has been a by-word for exceptional quality in the manufacture of electronic measuring devices. Back in 1945 the company's founder, engineer Ulrich Knick, started manufacturing high-precision zero-point-stabilized DC amplifiers, laying the foundation for the modules product range. These amplifiers also enabled the production of reliable and precise pH meters. Today Knick develops and sells a broad range of devices for industrial analog signal processing. About 50 % of the business volume is generated with analog interface products. The other half applies to the field of liquid analysis, where Knick's high-quality measuring systems have become established in industry and laboratory.



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Knick

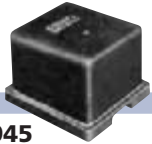
Innovative by Tradition

Today, company policy still focuses on a high technical level and a highly innovative orientation. Every fourth employee works in Research and Development. A large number of patents and licensing agreements are the result. Great emphasis is placed on Functional Safety, EMC, and explosion protection, where the firm has made a name for itself with its high level of expertise. The strategy of achieving business success through the provision of optimal technical solutions for demanding applications has proved successful and still promises stability and independence along with solid economic growth. The company's economic independence permits long-term work of the Development department focusing on innovation and sustainability – a necessary requirement for today's complex products and systems but still not met by everyone. As a result, Knick can provide products that reliably solve the arising tasks and problems and are a safe and long-lasting investment.

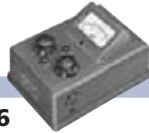


The Company

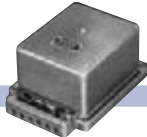
Chronology of Innovations



1945
First zero-point-stabilized modulated DC amplifier



1956
First laboratory pH meter with zero-point-stabilized Knick amplifier



1958
First zero point stabilized chopperless pH amplifier



1960
First transistorized chopper amplifier for measuring and control engineering



1964
First Knick amplifier for hazardous-area applications



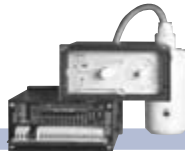
1964
First DC transformer for passive isolation in measuring and control engineering



1979
First microprocessor-controlled laboratory pH meter with automatic electrode calibration



1979
First industrial pH meter with digital display for on-site mounting in hazardous locations with a Zone-0 input



1980
First electrodeless conductivity measuring system for hazardous area applications with PTB-tested sensor



1980
First loop-powered digital indicator for mounting within hazardous locations



1980
First loop-powered DC transformer for mounting within hazardous locations



1985
First retractable probe controller for fully automated pH measurement



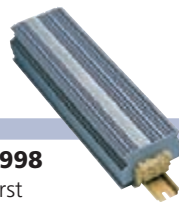
1995
First process analyzer for simultaneous measurement of pH and conductivity in hazardous areas



1996
First portable meter for hazardous area applications with IP 66 protection



1997
First process analyzer with 20 ... 253 V AC/DC broad-range power supply



1998
First terminal with electrical isolation



1999
First isolation amplifier in 12.5 mm modular housing with 20 ... 253 V AC/DC broad-range power supply and calibrated range selection



2000
First product line for liquid analysis with PROFIBUS® PA interface and "Profile for Process Control Devices"



2004
First IP68 isolation amplifier in M12 field housing



2005
First high-voltage isolator with broad-range power supply and 15 kV test voltage



2005
Ceramat® WA 160 – First remote-calibration immersion probe



2006
First universal transmitter for temperature, resistance, strain gages in 6-mm housing with SIL approval



2006
First open standard of a contactless plug-in connection for intelligent electrochemical sensors



2006
First O-ring sealed sensor lock-gate with long service life and easy on-site maintenance

Knick



1965
First zero-point-stabilized industrial pH transmitters for hazardous area applications



1967
First portable pH meter for hazardous-area applications (5000 operating hours without battery replacement)



1969
First compact digital pH meter



1972
First DC isolation amplifier from Knick for active isolation in measuring and control engineering.



1973
First portable pH meter with digital display and automatic sensor control (2500 measurements without battery replacement)



1976
First industrial pH transmitter for applications in the highest danger area Zone 0



1986
First system-capable DC calibrators in the DM 2000 price range



1988
Laboratory conductivity meter with 4-electrode sensor and a new circuit principle that for the first time enables measurements in the 1 µS/cm ... 1000 mS/cm range with a single sensor



1991
First loop-powered digital indicator with EMC to NAMUR



1992
First laboratory pH meter with complete self-monitoring including electrode and EMC according to NAMUR



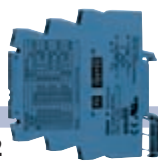
1992
First analyzer line with EMC and user interface to NAMUR



1995
First portable pH meter with data logger and PC interface



2001
First modular process analyzer in hygienic stainless steel enclosure



2002
First active isolation amplifier with 3-port isolation in 6 mm housing



2002
First portable meter for measuring dissolved oxygen with flow-free sensors



2003
First remote-calibration probe with maintenance-free ceramic sealing



2003
First measuring system for fully automated pH measurement in hygienic locations



2003
First repeater power supply in 6 mm housing



2006
First portable analyzer with water-tight, hygienic stainless steel enclosure



2006
First system for wireless signal transmission for pH, conductivity, and oxygen sensors

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pH measurement in the lab and in the field

Requirements for laboratories are constantly becoming stricter. On the one hand, more and more measuring results have to be obtained in shorter times and on the other measurement deviations should become fewer. This also applies for pH measurements. The results should have at least two decimal places, be reproducible, documented and of course be prepared for further processing and archiving on a PC.

These tasks require a pH meter which the user can rely on and which also does the largest part of his work for him.

Knick set reliability and easy handling as top priorities in the development of the Models 765 and 766 laboratory pH meters. These pH meters support the user's work not only by processing the measured values correctly, but also by providing an operating concept which to a great extent prevents handling errors and systematic errors with messages and intelligent routines.

The same requirements are often placed on mobile measurements in the field so that the measurement capabilities of portable meters are very similar to those of laboratory meters. Nowadays, many portable meters provide the same measurement accuracy as lab meters. In addition, the



mobile use generates particular demands on handling and mechanical characteristics, such as shape, size, robustness, tightness, etc.

As part of the Portamess® Series, Knick offers the portable pH meters 913 and 911 pH, which combine accuracy and flexibility of a lab meter with an enclosure design specially developed for field applications.

In practice, the unit convinces with a multitude of details: the

protective cover with short instructions, the integrated quiver for storing the electrode, the water-proof enclosure, and many more. As an extraordinary feature: Knick also offers hazardous-area variants of these units for measurements even in Zone 0 locations.

The following article looks at the special requirements and problems of pH measurement and describes the solutions provided by the respective Knick meters.

pH measurement



■ Problems with pH measurements

Measured value deviations (errors) cannot be avoided in any measuring task. Here, statistical deviations (incidental deviations) are distinguished from systematic deviations (recurring deviations).

With pH measurements, most of the errors which are caused by the measuring equipment (pH meter and electrode) and its systematic structure should be counted as systematic deviations. The statistical deviations are mainly caused by measuring equipment handling and operating errors.

■ Systematic problems

Perfect condition of the measuring equipment – consisting of the pH electrode, temperature probe, pH meter, and also the buffer solutions – is the basis for reliable measuring results. In practice, different influences do however cause changes to the measuring equipment.

■ Impurities on the electrode

Besides other errors caused by impurities, fault voltages on the reference electrode junction are particularly frequent and influential. These junction voltages can have various causes. They can be related to the process medium, also in particular to the pH value,

and are variable. As a part of the electrode voltage, they mostly remain unnoticed in a calibration and are “incorporated” in the calibration. Because of their unknown origin, their dependence on the process medium, and their variability, they still lead to errors even after a calibration.

Junction voltages can only be recognized with comparative measurements using special solutions. They are not recognized automatically. The pH meter cannot provide warnings or help when there are fault voltages on the junction. Here, the user has to rely on his own knowledge and caution or advice. However, he can counteract the error-causing impurities on the electrode with numerous measures, such as cleaning, rinsing, etc.

On pH meters from Knick, Sensoface® will help you assess the condition of the electrode. This automatic electrode monitoring system provides the user with information on the electrode condition. The zero point, slope, and response time of the electrode and the calibration timer are evaluated.

Three Sensoface® icons summarize the individual evaluations of these parameters.



– The electrode is in good condition.

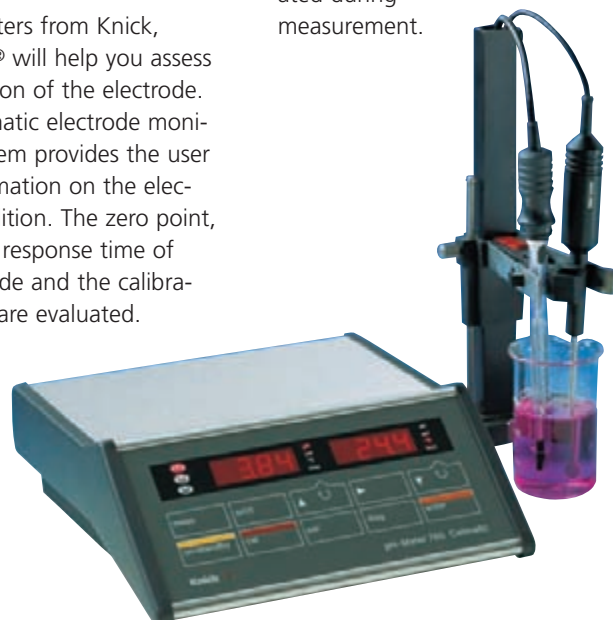


– The electrode is still usable, but should be calibrated.



– The electrode should absolutely be checked and calibrated.

The zero, slope, and response time parameters can only be calculated during calibration, whereas the calibration timer is evaluated during measurement.



The meter displays the evaluation of all individual parameters in the diagnostics menu at the press of a key.

If the Sensoface® icon does not return to the “good status” after you have taken the appropriate measures, for example calibration, the electrode should be replaced.

■ Electrode wear

No matter how well an electrode is treated and cared for, it will always show signs of aging and wear at some stage. Aging and wear mainly depend on the measured medium and the measuring temperature and can affect the electrode in different ways.

In the past, the user had to enter all calibration data in a logbook or a lab journal in order to assess the aging process of the electrode. On the Model 765, the electrode statistics system stores the zero, slope, and response time from the last three calibration procedures with the respective date and accompanying time. In addition, the data from the first calibration carried out with the electrode on the lab pH meter is stored. The user can use the electrode statistics to assess the performance of the electrode over its complete lifespan. Records can be printed out for documentation or the data transferred to a PC.

■ Error-free status of the meter

The user does not have to assess the general device status, only the calibration status. A modern lab or portable pH meter can inform the user about the device status. The meter must provide routines which automatically check all required criteria.

The lab and portable meters from Knick provide several self-test routines which run automatically at power-on. They check the operability of the hardware as well as the intactness of the device software (firmware). The display plays a special role: If, for example, a digit segment fails without being noticed, measured values may be displayed incorrectly. To prevent that, all display segments including the icons are switched on during the display test. This allows an easy optical inspection by the user.

These self-monitoring features – Gaincheck® for Models 911/913 and Fullcheck® for 765 Laboratory pH Meter – ensure a reliable identification of device faults.

Once the device self-test has been successfully concluded, the user can assume that the meter is in full working order according to the tested criteria.

■ Frequent handling errors

A pH meter can measure accurately but it cannot prevent the user from making handling errors. This includes errors like, for example, calibration with impure or spoiled buffers and also not calibrating the meter in time.



A modern pH meter can, however, help prevent handling errors with clear messages and a straightforward user guidance.

■ Calibration intervals

The time intervals after which calibration should be carried out depend on the measured medium and the measuring temperature and are based on empirical values. As a general rule, it is better to calibrate the unit too early than too late. Users often forget to calibrate the unit in

Knick

time or, for example, after a shift change no one is sure when the last calibration was carried out. Up to now, this problem could only be counteracted by applying the GLP recommendations (Good Laboratory Practice). Calibrations had to be documented in a log-book and calibration intervals had to be observed. This did not, however, guarantee that calibration was carried out according to these directions.

The cal timer on the 765 Laboratory pH Meter and the 913 pH Portable Meter reminds the user when calibration is due. The time interval for the calibration can be preset. This interval should be sufficiently short taking the type of measured medium, the measuring temperatures, and the qualitative requirements for measuring results into consideration. Measurements in different media with pH values and temperatures which deviate greatly

from one another, for example, require shorter calibration intervals than measurements in media with similar pH values at similar temperatures. Once approx. 80 % of the set interval has expired, the cal timer will switch the Sensoface® indicator from "good" to "average". The meter should now be calibrated. Once the total interval has expired, the indicator is set to "poor". The meter should be calibrated now at the latest.

This check reminds the user in good time when calibration needs to be carried out and allows him/her to concentrate fully on the actual measuring work.

■ Perfect buffer solutions

One basic requirement for correct pH measurements is using perfect buffer solutions which have not passed their expiry date.

Here, we strongly advise the user to follow the GLP recommendations and ensure that the buffer solutions used are always fresh, undiluted, and clean. Therefore, the pH electrode must never be immersed directly in the buffer bottle. A sufficient amount of buffer must be filled in a clean beaker. Then the electrode can be immersed in the solution. Anyone not observing these requirements will obtain unusable measurement results.

There is, however, a simple solution also to this problem. Knick supplies buffer solutions in disposable bags as accessories. The buffer solutions are sufficient for exactly one calibration procedure and are sealed. After calibration they are simply disposed of. This guarantees perfect buffer solutions.

■ Calibration procedure

Handling errors cannot be ruled out during calibration. The user could, for example, leave out certain steps or mix up buffers. Here as well only strict following of the GLP recommendations could prevent errors. This is no longer a problem with the Calimatic®. The user is guided safely through the calibration procedure. All necessary steps are indicated. The buffers can be placed in any order. The Calimatic® automatically assigns the buffer solution being used to the buffer set in the unit, measures the response time, calculates the zero and slope of the electrode and makes the necessary



Discourse

adjustments. The Sensoface® icons tell the user whether calibration was concluded successfully or whether it needs to be repeated.

■ Calibration in the expected range of the

measured medium

To obtain measurement results with lowest possible measured value deviations, it is important to know the range of the expected measured values on the pH scale.

The slope of the electrode is presumed to be linear. In practice, however, there are deviations from the straight line. These deviations become smaller if a 2-point calibration incorporates (brackets) the pH range in which measurements are being taken as close as possible. For example, if the measured value is expected to be between pH 5 and pH 6, calibration should be carried out with pH 4.01 and pH 7.00 buffers.

■ Observing the calibration and measuring temperature

A pH value is only useful if it is given together with the temperature of the measured medium. These values form a value pair. For best results, the calibration and measuring temperature should be the same. If that is not the case, the temperature difference must be taken into consideration.



The slope is then adjusted accordingly by the meter. The temperature sensitivity of the measured medium is mostly unknown and cannot be taken into consideration in normal laboratory conditions. The temperature sensitivity of the buffer solutions is known however and must be taken into consideration during calibration. The pH values for the different temperatures used to have to be read off the buffer containers.

The temperature sensitivities of seven commonly used buffer sets are stored in the lab and portable meters from Knick. The calibration temperature is calculated automatically or can be entered manually. The correct buffer value for the temperature is thus automatically taken over during calibration. The requirement for this is of course that the buffer solutions are in perfect condition.



■ Documentation duty

Since the introduction of ISO 9000 at the latest it has been necessary not only to ensure perfect condition of the measuring equipment but to also document this. This is also stipulated by GLP directives.

Any documentation is time consuming and incurs costs. To keep these to a minimum for the user, the units with interface (765 Laboratory pH Meter and 913 (X) pH portable meter) provide records of the last calibration, the device diagnostics, and the configuration. When a printer is connected, these records can be printed out at the push of a button. If the unit is provided with the electrode statistics option, the last three calibration procedures and the first calibration of the electrode can be displayed and printed out. The data can be read out via the RS 232 interface and processed further on a PC.

With the portable meters, you often have to take many measurements in the field, which must be carefully documented. The Model 913 (X) pH provides a storage for up to 100 measured values with date and time. Back in the lab, these data can be read out on a PC or directly documented with a printer. For this purpose, Knick offers a matrix printer for standard paper. This ensures that the measured values remain legible for years since bleaching thermal paper printouts do not satisfy the documentation requirements in the most cases.

■ Conclusion

The increasing requirements for laboratories also burden the user more and more and increase the number of tasks he has. This results in less time being left to work on the actual measuring task.

Knick supports the user with elaborate and practical solutions in its lab and portable units. Many features are provided to ensure accurate measurements conforming to GLP: Sensoface® provides information on the electrode status, the electrode statistics show the aging process of the electrode, Fullcheck® and Gaincheck® check the meter, the cal timer monitors calibration intervals, the Calimatic® ensures that calibration is carried out correctly and the record function provides the necessary documentation.

Using this kind of pH meter simplifies the user's measuring tasks substantially.

Knick pH meters do not change the pH measurement and also do not make it completely free of deviations which in any case is physically impossible. But they make pH measurement safer, easier, and comprehensible for the user and with their consistent design concept, they help to prevent errors.

This design philosophy focusing on quality, accuracy, and easy handling has also been implemented in the development of the conductivity and dissolved oxygen meters from Knick. The user interfaces of these devices are similar to those of the pH meters and therefore as easy to handle.

With its high-quality lab and portable meters, Knick decisively contributes to making liquid analysis more controlled and more reliable in laboratories as well as in the field.



Discourse

Portable Meters

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pH/ORP Measurement Site

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Conductivity Measurement

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Portable Meters

Knick >

Portamess® pH



A clear concept. The portable pH meters of the Portamess® pH Series.

Providing the functional abundance of high-quality benchtop meters with easy, icon-guided operation. Compact construction. Comfortable handling.

Robust enclosure, protected against strong jets of water. Appealing design. Extremely flat. Constructed for a firm grip.

Applications

Most versatile hazardous and safe-area applications, such as in industry, in the lab, for environmental protection, food processing, as well as water and wastewater measurements.

■ The facts

Also available for use in hazardous area ATEX II(2)G EEx ia IIC T4 ... T6, measurement in category 1 / Zone 0 possible

Calimatic® automatically recognizes the right buffer – automatic calibration at the press of a button

8 buffer sets to choose from

Simultaneous pH/mV and temperature display

Automatic device test during power-on

Sensoface® electrode monitoring

Temperature detection with automatic Pt 1000 / NTC 30 kOhm recognition

2000 operating hours on just 3 AA batteries

Battery indicator

Auto switch-off

EMC design



bundespreis
produkt design



**Warranty
3 years!**

*Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors and accessories: 1 year*

pH/ORP measurement

- Isolation Amplifiers Transmitters
- Indicators
- Process Analytics
- Portable Meters**
- Laboratory Meters
- Sensors
- Fittings



Knick >



Original size

pH/ORP Measurement

Portable Meters

Knick >

Portamess® 913 (X) pH



Portamess® 913 pH
**Fit for digital communi-
cation. Pioneering.**
Remote-controllable.

The keys

Smooth membrane keypad.
Durable. Easy to clean. No
sticking or crusty deposits.

The display

Large (15 mm character height).
Easy-to-read LC display. Antire-
flection natural glass. Scratch-
proof and resistant to chemicals.
Clear icons for operator guid-
ance. Sensoface®: Electrode
diagnostics with "Smileys".

The quiver

Integrated. Replaceable. Protects
the electrode. Transparent. Easy
to remove.

The enclosure

Blue. Ergonomic. Resistant to
impact and chemicals. Diecast
chassis. Water-tight (IP 66
protection).

The cover

Protects against dirt and damage.
Highly flexible lamellar joint.
Can be folded back completely.
Instructions on the back.

The hook

Fold-out. For hanging or stand-
ing up. Keeps both hands free for
handling the electrode.

The sockets

Robust. Water-tight. Gold-plated.

The carrying strap

Practical. Adjustable. Fixed
directly to the meter.

The clock

Integrated real-time clock.
With date.

The calibration

1-, 2-, and 3-point calibration.
Calimatic® automatically recog-
nizes the right buffer. 8 buffer
sets to choose from. Also manual
calibration possible. With any two
buffers.

The memory

Manual storage. Direct access
via 2 keys. 100 measured values
including temperature, memory
location number, time, and date.

The data logger

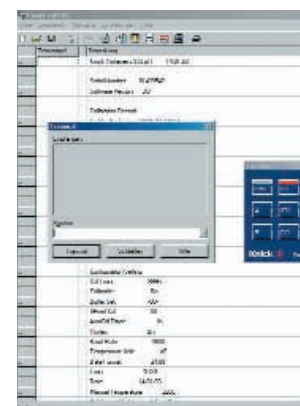
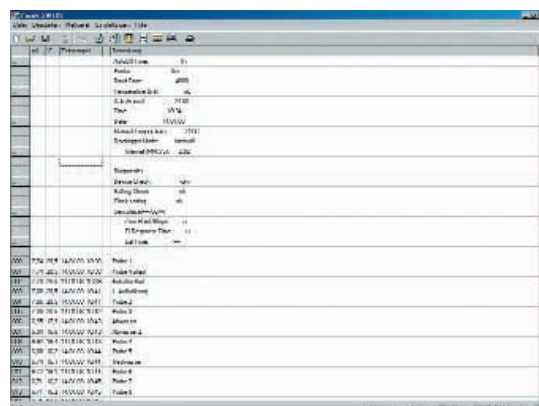
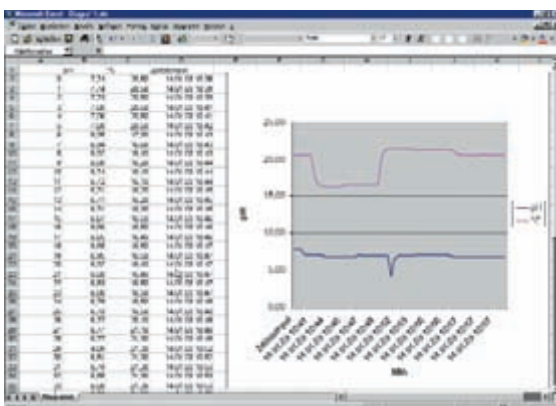
Unique. Automatic recording of
measured values over longer peri-
ods. Manual (with STO key), inter-
val (e. g. every 30 min.) or event-
controlled (based on a measured
value difference – this function
prevents unnecessary memory
consumption). Combined with a
PC, the meter can continuously
record any amount of data.

The interface

Serial. Either for prin-ter or PC
simply by turning plug around.
Saves paperwork, prevents manu-
al transcription errors. Supplies
records for QM documentation
(ISO 9000 and GLP). Portamess®
913 pH can be completely remote
controlled via interface.

The software

Convenient. Paraly® SW 109 tran-
fer software. Transfers measured
values to the PC. Comfortable
documentation and further pro-
cessing (e. g. with Microsoft Excel).
Data logger function. Remote
control of all device functions.



pH/ORP measurement

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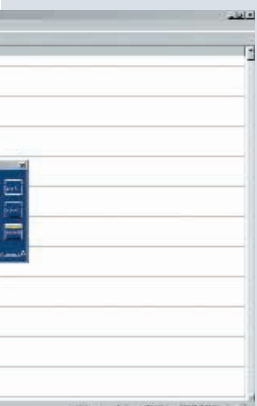
Knick >



Warranty
3 years!



Original size



Portable Meters

Knick >

Portamess® 911 (X) pH



Portamess® 911 pH
The basic unit for mobile pH measurement. Uncomplicated. Completely safe.

The keys

Smooth membrane keypad. Durable. Easy to clean. No sticking or crusty deposits.

The display

Large (15 mm character height). Easy-to-read LC display. Anti-reflection natural glass. Scratch-proof and resistant to chemicals. Clear icons for operator guidance. Sensoface®: Electrode diagnostics with "Smileys".

The quiver

Integrated. Replaceable. Protects the electrode. Transparent. Easy to remove.

The enclosure

Blue. Ergonomic. Resistant to impact and chemicals. Diecast chassis. Water-tight (IP 66 protection).

The cover

Protects against dirt and damage. Highly flexible lamellar joint. Can be folded back completely. Instructions on the back.

The hook

Fold-out. For hanging or standing up. Keeps both hands free for handling the electrode.

The sockets

Robust. Water-tight. Gold-plated.

The carrying strap

Practical. Adjustable. Fixed directly to the meter.

The calibration

1-, 2-, and 3-point calibration. Calimatic® automatically recognizes the right buffer. 8 buffer sets to choose from. Also manual calibration possible. With any two buffers.



pH/ORP measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick >



Warranty
3 years!



Original size

Portable Meters

Portamess® 913 (X) pH

■ Specifications

Portamess® 913 (X) pH

Ranges	pH: -2.00 ... +16.00; mV: -1300 ... +1300; °C: -20.0 ... +120.0
Accuracy (± 1 count)	pH: <0.01; mV: <0.1 % meas.val. ±0.3 mV; °C: <0.3 K
Electrode standardization	1-, 2-, or 3-point calibration, Calimatic® automatic calibration and buffer identification (German patent 29 37 227) 8 buffer sets to choose from*) see table, also manual calibration possible
Temperature compensation	Pt 1000 / NTC 30 kOhm (automatic recognition at power-on) or manual
EMC directive	89/336/EEC
EMC standard	EN 61326 / VDE 0843 Part 20: 2002-3
Explosion protection (for Ⓜ versions only)	II(2)G EEx ia IIC T4 ... T6 according to EC Directive 94 / 9 / EC, PTB 01 ATEX 2162 X
Device self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
Ambient conditions	Operating/ambient temp -10 ... +55 °C; Transport and storage temp -10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: pH, mV, °C
Power supply	3 alkaline AA batteries, autom. switch-off after 1 h or 12 h, selectable
Operating time	2000 h with 3 AA cells
Enclosure	Material: PA, IP 66 protected, with integrated electrode quiver
Dimensions	133 x 160 x 30 mm (W x H x D)
Weight	Approx. 560 g including batteries
Data memory	100 memory locations: pH/mV, °C, time and date
Clock	Integrated real-time clock with date
Data logger*)	100 data records, manual, interval, or event-controlled recording
Interface	RS 232C, serial, bidirectional, asynchronous, 600 ... 9600 bauds, configurable as printer or computer interface, data transfer for QM documentation (ISO 9000 and GLP).
Interface cable	Length 2 m, universal plug, either for PC or printer connection
Software	SW 109 transfer software: Recording of measurement data, memory contents and device records in tabular form, allows entering notes for each measured value (e. g. tag number), data transfer to other Windows applications (e. g. Excel), data-logger function, remote control of all device functions, included in supply. Control of Model 913 pH is integrated in the automation software for lab meters "labworldsoft" (Fisher Scientific) for display and control of device functions of Version 4.0 or higher.

*) Configurable

Portamess® 911 (X) pH



■ Specifications

Portamess® 911 (X) pH

Ranges	pH: -2.00 ... +16.00; mV: -1300 ... +1300; °C: -20.0 ... +120.0
Accuracy (±1 count)	pH: <0.01; mV: <0.1 % meas.val. ±0.3 mV; °C: <0.3 K
Electrode standardization	1-, 2-, or 3-point calibration, Calimatic® automatic calibration and buffer identification (German patent 29 37 227) 8 buffer sets to choose from*) see table, also manual calibration possible
Temperature compensation	Pt 1000 / NTC 30 kOhm (automatic recognition at power-on) or manual
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Self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
Ambient conditions	Operating/ambient temp -10 ... +55 °C; Transport and storage temp -10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: pH, mV, °C
Power supply	3 alkaline AA batteries, autom. switch-off after 1 h or 12 h, selectable
Operating time	2000 h with 3 AA cells
Enclosure	Material: PA, IP 66 protected, with integrated electrode quiver
Dimensions	133 x 160 x 30 mm (W x H x D)
Weight	Approx. 560 g including batteries

*) Configurable

Buffer sets

Buffer set – 00 –	Knick technical buffers: pH 2.00/4.01/7.00/9.21
Buffer set – 01 –	Mettler-Toledo (Ingold) technical buffers: pH 2.00/4.01/7.00/9.21
Buffer set – 02 –	Merck, Riedel: pH 2.00/4.00/7.00/9.00/12.00
Buffer set – 03 –	DIN 19 267: pH 1.09/4.65/6.79/9.23/12.75
Buffer set – 04 –	Ciba (94): pH 2.06/4.00/7.00/10.00
Buffer set – 05 –	NIST: pH 1.68/4.00/7.00/10.01/12.46
Buffer set – 06 –	DIN 19 266 and NIST (NBS): pH 1.679/4.006/6.865/9.180
Buffer set – 07 –	HACH: pH 4.00/7.00/10.18

Portable Meters

Combination pH electrodes for lab and field units

The Model SE 102 with glass body is an inexpensive combination electrode with Pt 1000 temperature probe and refillable electrolyte. For use in rougher environments, Knick offers the SE 101 electrode with plastic body. It is also equipped with an integrated Pt 1000 temperature probe and gel electrolyte. In addition, Knick also offers the SE 104 puncture

electrode. This gel-filled combination electrode is particularly robust and insensitive to pollution. Therefore, it is suited especially for measurements in semi-solid substances such as meat or cheese. The sensors are equipped with a handy electrode cap with O-ring, which securely fixes the sensor in the quiver of the Models 913 pH and 911 pH.

■ Specifications Combination pH electrodes

Combination pH electrodes	SE 101	SE 102	SE 104
Temperature probe	Pt 1000	Pt 1000	–
Body material	Plastic (PEEK)	Glass	Plastic (PEEK)
Body length	110 mm	110 mm	99 mm
Body diameter	12 mm	12 mm	6 ... 16 mm
Junction	2-hole junction	Ceramic	Hole junction
Electrolyte	Polymer	3 mol/l KCl, refillable	Polymer
pH measurement range	0 ... 14	0 ... 14	2 ... 11
Temperature range	0 ... 80 °C	0 ... 80 °C	0 ... 80 °C
Recommended temp probe	Integrated	Integrated	ZU 0156
Remarks	–	–	Puncture electrode



■ **Product line** Portable pH meters and combination pH electrodes



		Order No.
	Portamess® 913 pH	913 pH
	With clock, data memory, data logger, remote interface, as well as Paraly® SW 109 transfer software and interface cable, including batteries, electrode quiver, and carrying strap, without electrode.	
	Portamess® 913 X pH	913 X pH
	⊗-unit with clock, data memory, data logger, remote interface as well as Paraly® SW 109 transfer software and interface cable, including batteries, electrode quiver, and carrying strap, without electrode.	
	Portamess® 911 pH	911 pH
	Unit including batteries, electrode quiver, and carrying strap, without electrode.	
	Portamess® 911 X pH	911 X pH
	⊗-unit including batteries, electrode quiver, and carrying strap, without electrode.	
	pH/Pt 1000 combination electrode	SE 101
	Plastic body, length 110 mm	
	pH/Pt 1000 combination electrode	SE 102
	Glass body length 110 mm	
	Combination pH puncture electrode	SE 104
	Plastic body, length 99 mm	
	pH/Pt 1000 combination electrode	ZU 6979
	For measurements in hazardous areas Zone 0, including electrode equipotential bonding cable	

Portable Meters




■ Product line Accessories

		Order No.
	pH-Set A	For measurement in generally watery media (e. g. waste water, aquariums, swimming pools) and in water-based varnishes, paints, emulsions and suspensions. Suitable for field measurements, changing temperature and temperature-compensated measurements. Robust field case for meter and electrode including SE 101 combination pH/Pt 1000 electrode (plastic body), one bag each of Knick technical buffer solutions pH 4, 7, 9 and replacement electrode quiver.
	pH-Set B	For measurement in generally watery media, biological media, photographic chemicals, hot alkaline solutions, media containing sulfids, corrosive acid and alkaline solutions. For extreme pH values, high temperatures, temperature-compensated and high-precision measurements. Robust field case for meter and electrode including SE 102 pH/Pt 1000 combination electrode (glass body), one bag each of Knick technical buffer solutions pH 4, 7, 9 and replacement electrode quiver.
	pH-Set C	For puncture measurements (including in foodstuffs such as meat, fruit, and milk products). Also suitable for measuring soil samples. Robust field case for meter and electrode including SE 104 pH puncture electrode, one bag each of Knick technical buffer solutions pH 4, 7, 9 and replacement electrode quiver.
	Electrode quiver	5 quivers, as replacement, for leak-proof storage of electrodes
	Robust field case	For meter and sensor
	Lab printer	With the Lab Printer, you can document your measured values either at the press of a key or timer-controlled. Also records for QM documentation to ISO 9000 and GLP can be printed out with a single keystroke. The printer is equipped with a replaceable ribbon cartridge and prints on standard paper.
		ZU 0510
		ZU 0511
		ZU 0512
		ZU 0262
		ZU 0277
		ZU 0244

continued – Product line Accessories

			Order No.
	Printer paper	For ZU 0244 Lab Printer, 5 rolls	ZU 0249
	Ink ribbon	For ZU 0244 Lab Printer, 5 ribbons	ZU 0250

■ Product line Sensors and buffer solutions

			Order No.
	Pt 1000 temperature probe	For fast response temperature measurements: Monel 2.4360, -10 ... +100 °C, accuracy class A to IEC 751	ZU 6959
	Pt 1000 temperature probe	For fast response temperature measurements, with tilted tip for puncture measurements in semi-solid substances: Monel 2.4360, -10 ... 100 °C, pH 0 ... 14, accuracy class A to IEC 751	ZU 0156
	Calibration buffer set	With Knick technical buffer solutions, 250 ml each of pH 4.01, pH 7.00, pH 9.21, and KCl solution	ZU 0261
	Calibration buffer set	With standard buffer solutions to DIN 19266 and NIST (NBS), 250 ml each of pH 4, pH 7, and KCl solution	ZU 6941
	KCl solution	250 ml bottle	ZU 0062

Portable Meters

continued – Product line Sensors and buffer solutions



Knick technical buffers

	Order No.
pH 4.01 (set with 30 bags for one calibration each)	ZU 0263
pH 7.00 (set with 30 bags for one calibration each)	ZU 0264
pH 9.21 (set with 30 bags for one calibration each)	ZU 0265
pH 4.01 (1000 ml)	ZU 0200
pH 7.00 (1000 ml)	ZU 0201
pH 9.21 (1000 ml)	ZU 0202

■ Certificates of Conformity

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

EC-TYPE-EXAMINATION CERTIFICATE
(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - Directive 94/9/EC

(3) EC-type-examination Certificate Number: **PTB 01 ATEX 2162 X**

(4) Equipment: Battery-pH-meter Portameas, type 91, X pH

(5) Manufacturer: Knick Elektronische Messgeräte GmbH & Co.

(6) Address: Bauskestr. 22, 14183 Berlin, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0103 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB LU 01-20152.

(9) Conformity with the Essential Health and Safety Requirements has been assessed by comparison with:
EN 50014:1997 + A1 + A2 EN 50020:1994 EN 50284:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC type examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of the equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex II 2 (1) G EEx Ia IIC T4 ... T6

Zertifizierung für Explosionschutz
By order:
Dr. Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, January 24, 2002

sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificate may be distributed only without alteration. Content or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt in case of dispute, the German text shall prevail.
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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2162 X**

(15) **Description of equipment**

The battery-pH-meter Portameas, type 91, X pH, is primarily used for pH, redox, and temperature measurement in the electrochemical and environmental field. Pt-1000 or NTC sensors, which may be installed separately or be mounted in the measuring cell, provide for general precise temperature measurements and automatic temperature compensation while pH values are measured.

Use as category-1/2 equipment is only permissible in conjunction with the pH/PT 1000 combined measuring and reference electrode, type ZU 8978 X0.

Category 1/2 equipment

The battery-pH-meter Portameas, type 91, X pH, is used in potentially explosive atmospheres requiring category 2 equipment.

The pH/PT 1000 combined measuring and reference electrode, type ZU 8978 X0, is connected to the BU 2 socket of the unit and is installed in potentially explosive atmospheres requiring category-1 equipment.

For applications requiring category-1/2 apparatus, the permissible ambient temperature as well as the media process pressure has to range from -20 °C to 60 °C, and from 0.8 to 1.1 bar, respectively. Should these conditions not be met at the measuring sensor, it has to be considered that the measuring sensor (even in case of failure) does not show any self-heating effect. It should also be noted that the plant owner is responsible for safe operation of the plant as regards the pressure/temperature of the materials used. For the operating conditions when used without explosive mixtures, reference shall be made to the specifications provided by the manufacturer.

Category-2 equipment

The battery-pH-meter Portameas, type 91, X pH, the measuring cell, and the separate or mounted Pt-1000 and NTC sensors are installed in potentially explosive atmospheres for category-2 equipment.

For the relationship between temperature class and the permissible ambient temperature range, reference is made to the following table.

Temperature class	Permissible ambient temperature range
T6	-10 °C ... 40 °C
Ib	10 °C ... 40 °C
T4	-10 °C ... 55 °C

sheet 2/3

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pH/ORP measurement



continued – Product line Sensors and buffer solutions

Physikalisch-Technische Bundesanstalt 
Braunschweig und Berlin
SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2162 X

Electrical data
Auxiliary power 3 batteries Varta Universal Alkaline No. 4006, type Mignon, model LR6-AA-AM3 (alkali-manganese)
or 3 batteries Varta Universal Alkaline No. 8006, type Mignon, model LR6-AA-AM3 (alkali-manganese)
or 3 batteries Varta Standard No. 3706, type Mignon, model AA (zinc-dioxide)

pH/temperature measuring circuit type of protection intrinsic, Safety PFX Ia IIC (BU 2, 3, 4)
Maximum values:
 $U_s = 5 \text{ V}$
 $I_s = 11 \text{ mA}$
 $P_s = 13 \text{ mW}$
 $R_s = 497 \Omega$
 $C_s = 30 \text{ nF}$
 L_s negligibly low
 $C_i = 1.0 \mu\text{F}$
 $L_i = 100 \text{ mH}$

Interface circuits RoD, ToD $U_s = 253 \text{ V}$
(BU 5, 6, 7) The serial interface may only be used outside the hazardous area.
When the interface is connected to a circuit, neither the equipment nor the pH-temperature measuring circuit may be positioned inside the hazardous area.

(16) Test report PTB Ex 01-20152

(17) Special conditions for safe use
When used as category 1/2 equipment, the battery pH meter Portamess, type 91, X pII, shall electrostatically (contact resistance $\leq 1 \text{ M}\Omega$) be connected to the equipotential bonding conductor (e.g. using the same terminal).
The pH/Pi 1000 combined measuring and reference electrode, type ZU 6679 XD, may in tanks only be used in zone 0. Interference has to be made to the risk resulting from the release of explosive atmosphere and of flames penetrating from outside.

(18) Essential health and safety requirements
Met by compliance with the above standards.

Zertifizierungsstelle Explosionschutz
By order: 
Dr. Ing. U. Johannsmeyer
Regierungsdirektor 

Braunschweig, January 24, 2002

sheet 3/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificate may be cancelled only without alteration. Checks or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of doubt, the German National Press.
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Portable Meters

Knick >

Portamess® Cond



**Two perfect units.
The portable conductivity meters of the Portamess® 910 Cond Series.**

Providing the functional abundance of high-quality benchtop meters with easy, icon-guided operation. Compact construction. Comfortable handling.

Versatile. Elaborate. Two versions for reliable conductivity measurement. Robust enclosure. Protected against strong jets of water. Appealing design. Flat. Constructed for a firm grip.

Applications

Most versatile hazardous and safe-area applications, such as in industry, in the lab, for environmental protection, food processing, as well as water and waste-water measurements.



bundespreis
produkt design

■ The facts

Also available for use in hazardous area ATEX II(1)G EEx ia IIC T4 ... T6, measurement in category 1/Zone 0 possible

Suitable for 2- and 4-electrode sensors

Measurement of conductivity and temperature

Determination of salinity and TDS (Total Dissolved Solids)

Temperature compensation linear or nonlinear for natural waters to EN 27888

Sensor standardization by entry of cell constant

Automatic sensor standardization with KCl solutions

Sensor standardization with any solutions (conductivity standards)

Automatic device test during power-on

1000 operating hours on just 3 AA batteries

Auto switch-off

Battery indicator

EMC design



**Warranty
3 years!**

*Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors and accessories: 1 year*

Conductivity measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick >



Original size

Conductivity Measurement

Portable Meters

Knick >

Portamess® 913 Cond Series

Pioneering. Remote-controllable. Fit for digital communication.

The keys

Smooth membrane keypad. Durable. Easy to clean. No sticking or crusty deposits.

The display

Large (15 mm character height). Easy-to-read LC display. Anti-reflection natural glass. Scratch-proof and resistant to chemicals. Clear icons for operator guidance. Sensoface® sensor diagnostics with "Smileys".

The quiver

Integrated. Replaceable. Protects the sensor. Transparent. Easy to remove.

The enclosure

Blue. Ergonomic. Resistant to impact and chemicals. Diecast chassis. Water-tight (IP 66 protection).

The cover

Protects against dirt and damage. Highly flexible lamellar joint. Can be folded back completely. Instructions on the back.

Portamess® 913 (X) Cond



The hook

Fold-out. For hanging or standing up. Keeps both hands free for handling the sensor.

The sockets

Robust. Water-tight. Gold-plated.

The carrying strap

Practical. Adjustable. Fixed directly to the meter.

The clock

Integrated real-time clock. With date.

The memory

Manual storage. Direct access via 2 keys. 100 measured values including temperature, memory location number, time, and date.

The data logger

Unique. Automatic recording of measured values over longer periods. Manual (with STO key), interval (e. g. every 30 min.) or event-controlled (based on a measured value difference – this function prevents unnecessary

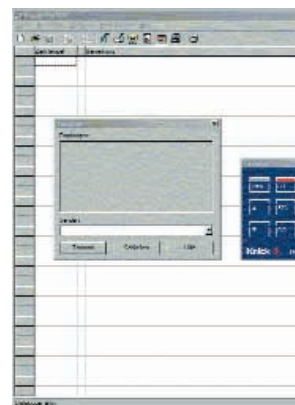
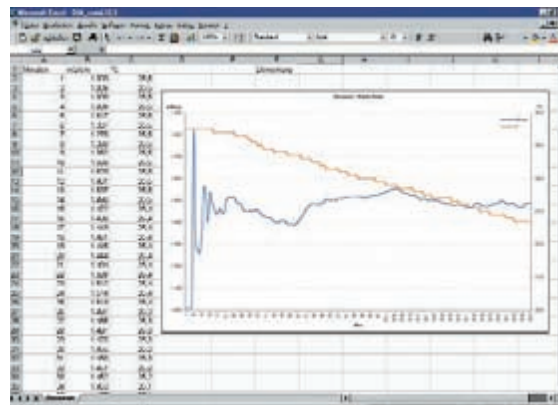
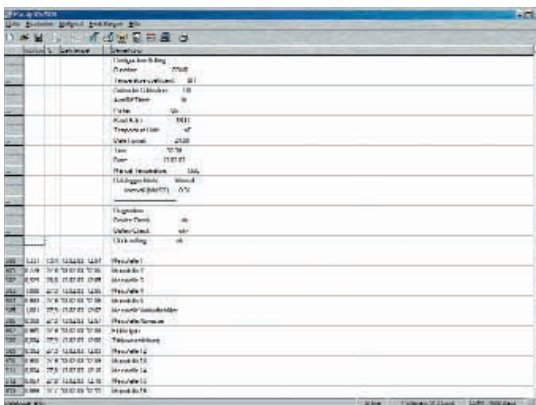
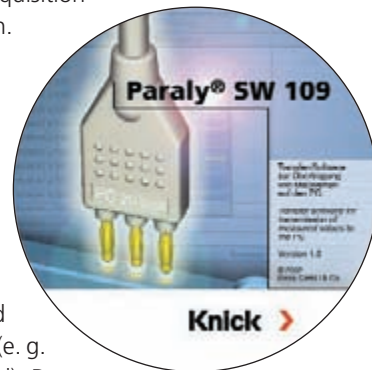
memory consumption). Combined with a PC, the meter can continuously record any amount of data.

The interface

Serial. Either for printer or PC by simply turning the plug around. Saves paper work. Prevents manual transcription errors. Supplies records for QM documentation (ISO 9000 and GLP). The Model 913 Cond can be completely remote-controlled via interface, e. g. for computer-controlled data acquisition and lab automation.

The software

Convenient. Paraly® SW 109 transfer software. Transfers measured values to the PC. Uncomplicated documentation and further processing (e. g. with Microsoft Excel). Data logger function. Remote control of all device functions.



Conductivity measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

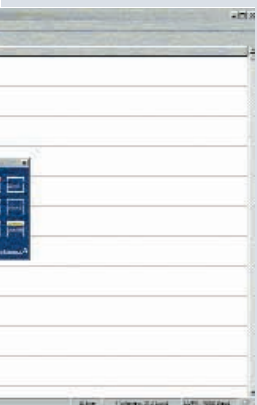
Fittings



Knick >



Warranty
3 years!



Original size

Portable Meters

Knick >

Portamess® 911 Cond Series

Basic unit for mobile conductivity measurement. Clear. Uncomplicated.

The keys

Smooth membrane keypad. Durable. Easy to clean. No sticking or crusty deposits.

The display

Large (15 mm character height). Easy-to-read LC display. Anti-reflection natural glass. Scratch-proof and resistant to chemicals. Clear icons for operator guidance.

The quiver

Integrated. Replaceable. Protects the sensor. Transparent. Easy to remove.

The enclosure

Blue. Ergonomic. Resistant to impact and chemicals. Diecast chassis. Water-tight (IP 66 protection).

Portamess® 911 (X) Cond



The cover

Protects against dirt and damage. Highly flexible lamellar joint. Can be folded back completely. Instructions on the back.

The hook

Fold-out. For hanging or standing up. Keeps both hands free for handling the sensor.

The sockets

Robust. Water-tight. Gold-plated.

The carrying strap

Practical. Adjustable. Fixed directly to the meter.



Conductivity measurement

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Knick >



Warranty
3 years!



Original size

Portable Meters

Portamess® 913 (X) Cond

■ Specifications

Portamess® 913 (X) Cond

Ranges	Conductivity: 0.01 µS/cm ... 1000 mS/cm (depending on sensor) Temperature: -20.0 ... +120 °C Salinity: 0.0 ... 45.0 g/kg (0 ... 30 °C) TDS: 0 ... 1999 mg/l (10 ... 40 °C)
Accuracy (± 1 count)	Conductivity: <0.5 % meas. val. (for >500 mS/cm <1 % meas. val.) / Temperature: <0.3 K
Sensor standardization	Direct entry of cell constant, autom. determination of cell constant with KCl solution 0.01 or 0.1 mol/l, sensor standardization with any known solutions
Cell constant	0.010 ... 199.9 cm ⁻¹ (adjustable)
Temp compensation*)	Without / linear characteristic: 0.01 ... 9.99 %/°C / nonlinear characteristic for ultrapure water and natural waters to EN 27888
EMC directive	89/336/EEC
EMC standard	EN 61326 / VDE 0843 Part 20: 2002-3
Explosion protection (Only for ☉ versions)	II2(1)G EEx ia IIC T4 ... T6 according to Directive 94/9/EC, PTB 02 ATEX 2161
Self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
Ambient conditions	Operating/ambient temp -10 ... +55 °C; Transport and storage temp -10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: mg/l, %, °C
Power supply	3 alkaline AA batteries, autom. switch-off after 1 h or 12 h, selectable
Operating time	Approx. 1000 h with 3 AA cells
Enclosure	Material: PA, IP 66 protected, with integrated sensor quiver
Dimensions	133 x 160 x 30 mm (W x H x D)
Weight	Approx. 560 g including batteries
Clock	Integrated real-time clock with date
Data logger*)	100 data records, manual, interval-controlled, 5 s ... 60 min, event-controlled 0.00 µS ... 1000 mS
Interface	RS 232 C, serial, bidirectional, asynchronous, 600 ... 9600 bauds, data transfer for QM documentation (ISO 9000 and GLP).
Interface cable	Length 2 m, universal plug, either for PC or printer connection
Software	SW 109 transfer software: Recording of measurement data, memory contents and device records in tabular form, allows entering notes for each measured value (e. g. tag number), Transfer of data to other Windows applications (e. g. Excel), included in supply. Control of Model 913 Cond is integrated in the automation software for lab meters "labworldsoft" (Fisher Scientific) for display and control of device functions of Version 4.0 or higher.

*) Configurable

Portamess® 911 (X) Cond



■ Specifications

Portamess® 911 (X) Cond

Ranges	Conductivity: 0.01 µS/cm to 1000 mS/cm (depending on sensor) Temperature: -20.0 ... +120 °C Salinity: 0.0 ... 45.0 g/kg (0 ... 30 °C) TDS: 0 ... 1999 mg/l (10 ... 40 °C)
Accuracy (±1 count)	Conductivity: <0.5 % meas. val. (for >500 mS/cm <1 % meas. val.) Temperature: <0.3 K
Sensor standardization	Direct entry of cell constant, autom. determination of cell constant with KCl solution 0.01 or 0.1 mol/l, sensor standardization with any known solutions
Cell constant	0.010 ... 199.9 cm ⁻¹ (adjustable)
Temp compensation*)	Without / linear characteristic: 0.01 ... 9.99 %/°C nonlinear characteristic for ultrapure water and natural waters to EN 27888
EMC directive	89/336/EEC
EMC standard	EN 61326 / VDE 0843 Part 20: 2002-3
Explosion protection (Only for Ex versions)	II2(1)G EEx ia IIC T4 ... T6 according to Directive 94/9/EC, PTB 02 ATEX 2161
Self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
Ambient conditions	Operating/ambient temp -10 ... +55 °C; Transport and storage temp -10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: mg/l; %, C
Power supply	3 alkaline AA batteries, autom. switch-off after 1 h
Operating time	Approx. 1000 h with 3 AA cells
Enclosure	Material: PA, IP 66 protected, with integrated sensor quiver
Dimensions	133 x 160 x 30 mm (W x H x D)
Weight	Approx. 560 g including batteries

*) Configurable

Portable Meters

■ Specifications Combination pH electrodes

Conductivity sensors	SE 202	SE 204	ZU 6985
Number of electrodes	2	4	4
Body	Stainless steel 1.4571	Epoxy, black	Glass
Electrode material	Stainless steel 1.4571	Graphite	Platinum, bare
Body length	120 mm	120 mm	110 mm
Body diameter	12 mm	15.3 mm	Tube 16 mm
Temperature probe	NTC (30 kOhm): -5 ... +100 °C	NTC (30 kOhm): -5 ... +100 °C	Pt 1000: -20 ... +100 °C
Immersion depth	Min.: 30 mm, max.: Total length incl. cable	Min.: 36 mm, max.: Total length incl. cable	Min. 60 mm Max. 80 mm
Pressure resistance	2 bars	2 bars	2 bars
Cell constant	0.100 cm ⁻¹ ±2 %	0.475 cm ⁻¹ ±1.5 %	1.19 cm ⁻¹ ±1 %
Ranges	0,01 ... 200 µS/cm	1 µS/cm ... 500 mS/cm	1 µS/cm ... 1000 mS/cm
Remarks	Incl. flow cell	-	-

Order No.

SE 202

SE 204

ZU 6985



Conductivity measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

Knick 

■ **Product line** Portable pH meters and combination pH electrodes

		Order No.
	Portamess® 913 Cond	913 Cond
	Unit with clock, data memory, data logger, remote interface, as well as Paraly® SW 109 transfer software and interface cable, including batteries, sensor quiver, and carrying strap, without sensor.	
	Portamess® 913 X Cond	913 X Cond
	☒-unit with clock, data memory, data logger, remote interface as well as Paraly® SW 109 transfer software and interface cable, including batteries, sensor quiver, and carrying strap, without sensor.	
	Portamess® 911 Cond	911 Cond
	Unit including batteries, sensor quiver, and carrying strap, without sensor.	
	Portamess® 911 X Cond	911 X Cond
	☒-unit including batteries, sensor quiver, and carrying strap, without sensor.	
	2-electrode sensor	SE 202
	With integrated temperature probe (NTC 30 kOhm), stainlesssteel body Incl. flow cell. For measurement in low-conductivity solutions such as ultrapure water and boiler feed water, e. g. for monitoring water desalination plants.	
	4-electrode sensor	SE 204
	With integrated temperature probe (NTC 30 kOhm), epoxy body. For measurement in natural waters such as surface water or drinking water, in aqueous solutions such as acid and alkaline solutions and for salinity determination of sea water.	
	4-electrode sensor	ZU 6985
	With glass body (ZU 0290 adapter required). The sensor functions reliably over a wide conductivity range from <math><1.00 \mu\text{S}/\text{cm}</math> to >1000 mS/cm and is equipped with a quick-reacting Pt 1000 temperature probe. It is provided with a glass/platinum measuring system with an easy-to-replace KPG® tube. It is simple to clean and requires no platinization. The glass body makes it suitable for laboratory applications.	

Portable Meters

■ Product line Accessories

		Order No.
	pH-Set A	For measurement in natural waters such as surface water or drinking water, in aqueous solutions such as acid and alkaline solutions and for salinity determination of sea water. Robust field case for meter, universally applicable SE 204 4-electrode sensor with integrated temperature probe and replacement sensor quiver.
	pH-Set B	For measurement in low-conductivity solutions such as ultrapure water and boiler feed water, e. g. for monitoring water desalination plants. Robust field case for meter, SE 202 2-electrode sensor with integrated temperature probe, flow cell, and replacement sensor quiver.
	Sensor quiver	5 quivers, for leak-proof storage of sensors
	Robust field case	For meter and sensor
	Lab printer	With the Lab Printer, you can document your measured values either at the press of a key or timer-controlled. Also records for QM documentation to ISO 9000 and GLP can be printed out with a single keystroke. The printer is equipped with a replaceable ribbon cartridge and prints on standard paper.
	Printer paper	For ZU 0244 Lab Printer, 5 rolls
	Ink ribbon	For ZU 0244 Lab Printer, 5 ribbons

Conductivity measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters


Laboratory Meters

Sensors

Fittings

Knick 

■ **Product line** Sensors and buffer solutions

		Order No.
	Conductivity standard	<p>For determination and checking of cell constants. 1 ampoule for producing 1000 ml 0.1 mol/l NaCl solution (12,88 mS/cm)</p> <p>ZU 6945</p>
		<p>For determination and checking of cell constants. Conductivity 12.88 mS/cm ± 1 % (0.1 mol/l KCl), 250 ml solution, ready for use</p> <p>ZU 0348</p>
		<p>For determination and checking of cell constants. Conductivity 1413 μS/cm ± 1 % (0.01 mol/l KCl), 250 ml solution, ready for use</p> <p>ZU 0349</p>
		<p>For determination and checking of cell constants. Conductivity 147 μS/cm ± 1 %, 500 ml solution, ready for use</p> <p>ZU 0702</p>
		<p>For determination and checking of cell constants. Low conductivity 15 μS/cm ± 5 %, 300 ml solution, ready for use</p> <p>ZU 0350</p>
	KPG® tube	<p>For ZU 3985 4-electrode sensor, incl. O-ring</p> <p>ZU 0180</p>
	Replacement flow cell	<p>For SE 202 2-electrode sensor</p> <p>ZU 0284</p>
	Adapter	<p>For connecting a conductivity sensor with 2 banana plugs to a meter of the Portamess® 910 Cond Series</p> <p>ZU 0289</p>
		<p>For connecting the ZU 6985 4-electrode sensor to a meter of the Portamess® 910 Cond Series</p> <p>ZU 0290</p>

Portable Meters

■ Certificates of Conformity

Physikalisch-Technische Bundesanstalt 
Braunschweig und Berlin



(1) EC-TYPE-EXAMINATION CERTIFICATE
(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC type examination Certificate Number:
PTB 01 ATEX 2161

(4) Equipment: Battery conductometer Portamess, type 91...X Cond

(5) Manufacturer: Knick Elektronische Messgeräte GmbH & Co.

(6) Address: Brauckstr. 77, 14165 Berlin, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the essential health and safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the certificate of approval PTB Ex 01-20449.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60074:1997 + A1 + A2 **EN 50220:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC type examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of the equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

 **II 2 (1) G EEx ia IIC T4 ... T6**

Braunschweig, January 24, 2002


Zertifizierungsbüro Explosionschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor



sheet 1/3

EC-type examination Certificate without signature and official stamp shall not be valid. The certificate may be circulated only without alteration. Copies or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.
Physikalisch-Technische Bundesanstalt - Bundesallee 100 - D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt 
Braunschweig und Berlin

SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2161**

(15) Description of equipment

The equipment is primarily used for conductivity and temperature measurement in electrochemical and environmental fields.

Pt-1000 or NTC sensors, which may be installed separately or be mounted in the measuring cell, provide for general precise temperature measurements and automatic temperature compensation while the conductivity is measured.

The equipment is used in the potentially explosive atmosphere.

For the relationship between temperature class and the permissible ambient temperature range, reference is made to the following table:

Temperature class	Permissible ambient temperature range
T6	-10 °C ... 40 °C
T5	-10 °C ... 40 °C
T4	-10 °C ... 55 °C

Electrical data


Auxiliary power 3 batteries Varta Universal Alkaline No. 4006, type Mignon, model LRG-AA-AM3 (alkali-manganese) or 3 batteries Varta Universal Alkaline No. 8006, type Mignon, model LRG-AA-AM3 (alkali-manganese) or 3 batteries Varta Standard No. 3706, type Mignon, model AA (zinc-chloride)

LF/temperature measuring circuits type of protection Intrinsic Safety EEx ia IIC (BU 2, 3, 4)

Maximum values:
 $U_0 = 10 \text{ V}$
 $I_0 = 55 \text{ mA}$
 $P_0 = 60 \text{ mW}$
 $R_0 = 57 \text{ }\Omega$
 $C_0 = 50 \text{ nF}$
 L_0 : negligibly low
 $C_0 = 870 \text{ nF}$
 $L_0 = 1 \text{ mH}$

sheet 2/3

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Physikalisch-Technische Bundesanstalt 
Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2161

Interface circuit: Rx/D, Tx/D $U_0 = 253 \text{ V}$
(BU 2, 3, 4) The serial interface may only be used outside the hazardous area.
When the interface is connected to a circuit, neither the equipment nor the pH-temperature measuring circuit may be positioned inside the hazardous area.

(16) Test report PTR Ex 01-20449

(17) Special conditions for safe use
None

(18) Essential health and safety requirements
Met by compliance with the above standards.

Zertifizierungsbüro Explosionschutz
By order:

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, January 24, 2002



sheet 3/3

EC-type examination Certificate without signature and official stamp shall not be valid. The certificate may be circulated only without alteration. Copies or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.
Physikalisch-Technische Bundesanstalt - Bundesallee 100 - D-38116 Braunschweig

Conductivity measurement

Isolation Amplifiers Transmitters
Indicators
Process Analytics
Portable Meters
Laboratory Meters
Sensors
Fittings



Portable Meters

Knick >

Reliable portable measurement of dissolved oxygen – precise and convenient.

Portamess® Oxy



Compact portable units providing the functional abundance of high-quality benchtop meters. The specially designed sensors require no flow and provide highly accurate values. Thanks to the continuous polarization of the sensors, they are always ready to use.

Icon-guided operation. Easy handling. Water-proof enclosure, specially developed for field applications. Appealing design. Extremely flat. Constructed for a firm grip.

Applications

Most versatile applications, such as in industry, for environmental protection, food processing, as well as water or waste-water treatment.

**Warranty
3 years!**

*Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors and accessories: 1 year*

■ The facts

Measurement with flow-free SE 302 and SE 303 DO sensors – stirrer not required

Automatic calibration in air (in integrated calibration chamber) with one-button operation

Automatic correction of temperature and pressure influences

Continuous polarization of sensor for immediate readiness

SE 302 and SE 303 sensors, maintenance-free

Lab/field measurements with SE 302 sensor – immersion measurements with SE 303

Comparative measurements or performance checks of process sensors by means of adapter cable

Ability to enter the salt content for correcting the solubility function

Zero calibration not required for Knick SE 302/303 sensors, possible for sensors with offset

Cal timer

Simultaneous display of dissolved oxygen and temperature
Cal timer

Display of oxygen saturation or concentration

Switch-on test with display check

Battery indicator

1000 operating hours on just 3 AA batteries

Auto switch-off (polarization voltage of sensor is not switched off)

Storage of 200 measured values with date and time

Data logger



DO measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick >



bundespreis
produkt design



Original size

Portable Meters

Knick >

Portamess® 913 Oxy



Portamess® 913 Oxy
Fit for digital communication. Pioneering.
Remote-controllable.

The keys

Smooth membrane keypad.
 Durable. Easy to clean. No sticking or crusty deposits.

The display

Large, easy-to-read LC display (67 x 35 mm). Antireflection natural glass. Scratch-proof and resistant to chemicals. Clear icons for operator guidance. Sensiface®: Sensor diagnostics with "Smileys".

The quiver

Integrated. Transparent.
 Removable sensor quiver with moisturizing fleece. Easy to replace.

The enclosure

Blue. Sturdy. Well thought-out. Ergonomic. Resistant to impact and chemicals. Water-tight (IP 66 protection).

The cover

Protects against dirt and damage and serves as stand-up support.

Highly flexible lamellar joint.
 Can be folded back completely.
 Instructions on the back.

The hook

Fold-out. For hanging or standing up. Keeps both hands free for handling the sensor.

The sockets

Robust. Water-tight. Gold-plated.

The carrying strap

Practical. Adjustable.
 Fixed directly to the meter.

The clock

Integrated. With date.
 Switchable to US time and date format.

The calibration

Automatic calibration in air (in integrated calibration chamber) with one-button operation.

The memory

200 measured values with time, date, and index for the Auto

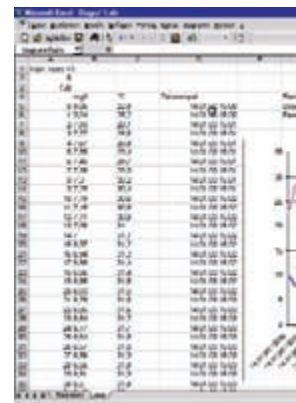
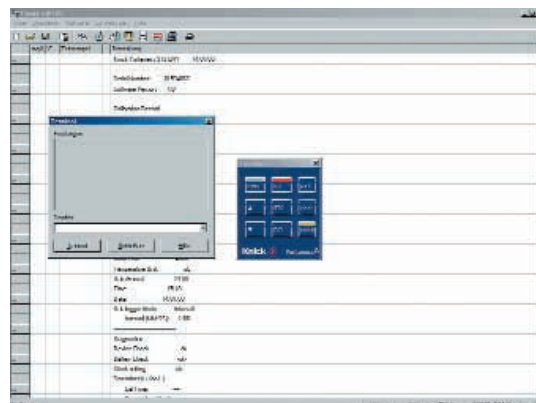
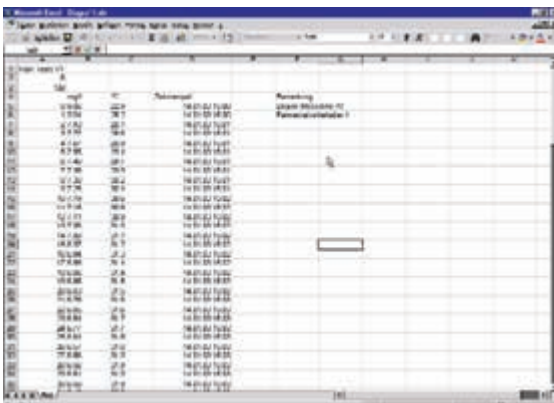
Read function for reproducible measurements with drift control.

The data logger

Unique. Automatic recording of measured values over longer periods. Either manual (with STO key), interval-controlled (5 s to 60 min), or event-controlled by measured-value changes – adjustable from 0.01 to 19.99 mg/l). Combined with a PC, the meter can continuously record any amount of data.

The interface

Bidirectional. Serial. Either for printer or PC by simply turning the plug around. Saves time-consuming writing, prevents manual transfer errors. Supplies records for QM documentation (ISO 9000 and GLP). The Model 913 Oxy can be completely remote-controlled via interface, e. g. for computer-controlled data acquisition and lab automation).



DO measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

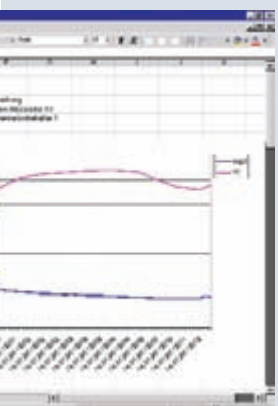
Knick >

Warranty
3 years!



The software

Convenient. Paraly® SW 109 transfer software. Transfers measured values to the PC. Uncomplicated documentation and further processing (e. g. with Microsoft Excel). Data logger function. Remote control of all device functions.



Portable Meters

Knick >

Portamess® 911 Cond Series
Basic unit for mobile
dissolved oxygen measure-
ment. Clear. Uncomplicated.

The keys

Smooth membrane keypad.
Durable. Easy to clean. No
sticking or crusty deposits.

The display

Large, easy-to-read LC display
(67 x 35 mm). Antireflection
natural glass. Scratch-proof and
resistant to chemicals. Clear
icons for operator guidance.
Sensoface®: Sensor diagnostics
with "Smileys".

The quiver

Integrated. Transparent.
Removable sensor quiver
with moisturizing fleece.
Easy to replace.

Warranty
3 years!

Portamess® 911 Oxy



The enclosure

Blue. Robust. Well thought-out.
Ergonomic. Resistant to impact
and chemicals. Water-tight
(IP 66 protection).

The cover

Protects against dirt and damage
and serves as stand-up support.
Highly flexible lamellar joint.
Can be folded back completely.
Instructions on the back.

The hook

Fold-out. For hanging or standing
up. Keeps both hands free for
handling the sensor.

The sockets

Robust. Water-tight.
Gold-plated.

The carrying strap

Practical. Adjustable.
Fixed directly to the meter.



DO measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick >

CE



Original size

Portable Meters

Portamess® 913 Oxy

■ Specifications

Portamess® 913 Oxy

Ranges	Measuring current 0 ... 600 nA
Oxygen saturation	0.0 ... 600.0 % (0 °C to 55 °C) meas. error: 0.5 % meas. val. +0.2 % saturation
Oxygen concentration	0.00 ... 60.00 mg/l (0 °C to 55 °C) meas. error: 0.5 % meas. val. +0.05 mg/l
Barometric pressure	700 ... 1080 hPa
Salt correction	Configurable to 0.00 ... 45.00 g/kg, solubility function to EN 25814
Sensor standardization [cal]	Automatic with water-saturated air in quiver, zero calibration possible
Calibration range	Zero ±2 nA, Slope 25 ... 130 nA
Calibration timer	0 ... 14 days, default setting 6 days
Pressure correction	Automatic using integrated pressure sensor
Temperature compensation	Automatic with integrated NTC 22 kOhm
Range	0.0 ... +55.0 °C / 32 ... +131 °F
Resolution	0.1 °C / 1 °F
Measurement error	<0.5 K
Self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
EMC directive	89/336/EEC
EMC standard	EN 61326 / VDE 0843 Part 20: 2002-3
Ambient conditions	Operating / ambient temp –10 ... +55 °C; Transport and storage temp –10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: mg/l, %, °C
Power supply	3 alkaline AA batteries, operating time approx. 1000 h; autom. switch-off after 1 h
Enclosure	Material: PA, IP 66 protected, with integrated sensor quiver
Dimensions / weight	133 x 160 x 30 mm (W x H x D) / approx. 560 g incl. batteries
Clock	Integrated real-time clock with date
Data memory	200 memory locations: mg/l or %, temperature, time, date

Portamess® 913 Oxy



■ Specifications

continued – Portamess® 913 Oxy

Data logger*)

200 data records, stored in the meter with time, date, and AutoRead index, unlimited number of records when connected to PC, recording: manual, interval-controlled 5 s ... 60 min or event-controlled 0.01 ... 19.99 mg/l).

Interface

RS 232 C, serial, bidirectional, asynchronous, 600 ... 9600 bauds, data transfer for QM documentation (ISO 9000 and GLP).

Interface cable

Length 1 m, universal plug, either for PC or printer connection

Software

SW 109 transfer software: Recording of measurement data, memory contents and device records in tabular form, allows entering notes for each measured value (e. g. tag number), Transfer of data to other Windows applications (e. g. Excel), included in supply. Control of Model 913 Oxy is integrated in the automation software for lab meters "labworldsoft" (Fisher Scientific) for display and control of device functions of Version 4.0 or higher.

*) Configurable

Portable Meters

Portamess® 911 Oxy

■ Specifications

Portamess® 911 Oxy

Ranges	Measuring current 0 ... 600 nA
Oxygen saturation	0.0 ... 600.0 % (0 °C to 55 °C) meas. error: 0.5 % meas. val. + 0.2 % saturation
Oxygen concentration	0.00 ... 60.00 mg/l (0 °C to 55 °C) meas. error: 0.5 % meas. val. +0.05 mg/l
Barometric pressure	700 ... 1080 hPa
Salt correction	Configurable to 0.00 ... 45.00 g/kg, solubility function to EN 25814
Sensor standardization [cal]	Automatic with water-saturated air in quiver, zero calibration possible
Calibration range	Zero ±2 nA, Slope 25 ... 130 nA
Calibration timer	0 ... 14 days, default setting 6 days
Pressure correction	Automatic using integrated pressure sensor
Temperature compensation	Automatic with integrated NTC 22 kOhm
Range	0.0 ... +55.0 °C / 32 ... +131 °F
Resolution	0.1 °C / 1 °F
Measurement error	<0.5 K
Self-test	Automatic at power-on
Data retention	Parameters and calibration data >10 years (EEPROM)
EMC directive	89/336/EEC
EMC standard	EN 61326 / VDE 0843 Part 20: 2002-3
Ambient conditions	Operating / ambient temp -10 ... +55 °C; Transport and storage temp -10 ... +70 °C
Display	LC display 67 x 67 mm, character height 15 mm; measured value display: mg/l; %, C
Power supply	3 alkaline AA batteries, operating time approx. 1000 h; autom. switch-off after 1 h
Enclosure	Material: PA, IP 66 protected, with integrated sensor quiver
Dimensions / weight	133 x 160 x 30 mm (W x H x D) / approx. 560 g incl. batteries

*) Configurable

■ Specifications Dissolved oxygen sensors

Oxygen sensors








	SE 302	SE 303
Function principle	Membrane-covered, amperometric sensor	Membrane-covered, amperometric sensor
Range	0.01 to 60 mg/l at 25 °C	0.01 to 60 mg/l at 25 °C
Detection limit	<0.3 % of signal in room air, max 30 ppb	<0.3 % of signal in room air, max 30 ppb
Body length	120 mm	120 mm
Body diameter	12 mm	12 mm
Thread	–	For ZU 0605 immersion weight
Cable length	1.5 m	5 m
Membrane	T-96: Teflon/silicone/Teflon (reinforced with steel mesh)	T-96: Teflon/silicone/Teflon (reinforced with steel mesh)
Body	PPS	PPS
O rings	Viton, silicone	Viton, silicone
Connection	Cable with SixPlug cap	Cable with SixPlug cap
Temperature probe	NTC 22 kΩ	NTC 22 kΩ
Temperature range	0 to 60 °C	0 to 60 °C
Ambient conditions	Air humidity 0 to 100 %	Air humidity 0 to 100 %
Sensor signal in room air	50 to 110 nA at 25 °C	50 to 110 nA at 25 °C
Sensor signal in oxygen-free medium	<0.3 % of signal in room air	<0.3 % of signal in room air
Response time	t _{98%} <90 s at 25 °C, from air to nitrogen	t _{98%} <90 s at 25 °C, from air to nitrogen
Accuracy	±1 % of signal, max ±30 ppb	±1 % of signal, max ±30 ppb
Dependency on flow	<5 %, 1 % at 0.3 m/s	<5 %, 1 % at 0.3 m/s
Polarization voltage	–675 mV	–675 mV
Polarization time	<6 h	<6 h
Submersibility	–	5 m

Order No.







SE 302
SE 303
ZU 0605


Portable Meters

■ **Product line** Portable oxygen meters and oxygen sensors

		Order No.
	Portamess® 913 Oxy	913 Oxy
	Unit with clock, date, data memory, data logger, and interface, as well as Paraly® transfer software and interface cable, including batteries, sensor quiver, and carrying strap, without sensor	
	Portamess® 911 Oxy	911 Oxy
	Unit including batteries, sensor quiver, and carrying strap, without sensor.	
	Oxy Set A	ZU 0602
	For lab and field measurements, consisting of: Dissolved oxygen sensor SE 302, robust field case, replacement quiver, and fleece (8 units)	
	Oxy Set B	ZU 0603
	For immersion measurements, consisting of: SE 303 dissolved oxygen sensor, protection sleeve/immersion weight, robust field case, replacement quiver, and fleece (8 units)	
	Dissolved oxygen sensor	SE 302
	With 1.5 m cable. The SE 302 and 303 sensors require no flow and provide highly accurate values. Thanks to the continuous polarization of the sensors, they are always ready to use.	
	DO immersion sensor	SE 303
	With 5 m cable (without protection sleeve/immersion weight). The SE 302 and 303 sensors require no flow and provide highly accurate values. Thanks to the continuous polarization of the sensors, they are always ready to use.	
	Protection sleeve / Immersion weight	ZU 0605
	Protection sleeve/immersion weight for SE 303 DO immersion sensor, Pg 13.5 thread	

■ Product line Further accessories

		Order No.
	Flow-through fitting	For SE 302 sensor, glass, with hose connections ZU 0284
	Sensor quiver	5 units (calibration chamber and moisturizing fleece) ZU 0331
	Moisturizing fleece	8 units (for sensor quiver) ZU 0571
	Membrane kit	for dissolved oxygen-sensor SE 302 and SE 303 (4 membrane-bodies, 1 O-ring set, 25 ml electrolyte) ZU 0564
	Lab printer	Matrix printer with serial RS 232 interface, for standard paper, with 57.5 mm. With the Lab Printer, you can document your measured values either at the press of a key or timer-controlled. Also records for QM documentation to ISO 9000 and GLP are printed at a single keystroke. The printer is equipped with a replaceable ribbon cartridge and prints on standard paper. ZU 0244
	Printer paper	For ZU 0244 Lab Printer, 5 rolls ZU 0249
	Ink ribbon	For ZU 0244 Lab Printer, 5 ribbons ZU 0250
	Connecting cable	For connecting process sensors with 4-pole cap to the Models 911/913, 3 m ZU 0554
		For connecting process sensors with VP cap to the Models 911/913, 3 m ZU 0554



Laboratory Meters

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

Knick >

pH/ORP Measurement

Site

765 Laboratory pH Meter

Sensors, Accessories

60

66

766 Laboratory pH Meter

Sensors, Accessories

72

77

Conductivity Measurement

703 Laboratory Conductivity Meter

Sensors, Accessories

82

88



Laboratory Meters

Knick >

Quality assurance does not stop at your lab door.

765 Laboratory pH Meter



To make reliable pH measurements easier than ever, Knick has equipped the Model 765 Laboratory pH Meter with an exemplary package of safety functions.

Fullcheck®

automatically checks the device functions during power-on. Also during operation, a complete instrument check can be carried out at a single key-stroke. Here, also display and keypad are checked besides the electrical characteristics.

Record printouts

With record printouts of the device self-test, the calibration, and the parameter settings, it is possible (as part of quality management to ISO 9000 and GLP) to document the service-ability and the regular maintenance and calibration of the unit.

Sensoface®

checks the electrode and provides information on the electrode condition. The zero, slope, response time, and glass impedance of the electrode as well as the calibration interval are evaluated.

Calimatic®

automatically recognizes the right buffer. It allows calibration at the stroke of a key, providing ease of use and – above all – safety.

You simply immerse the electrode in two buffers of the selected set, no matter which one you take first, and press the cal key. The meter automatically recognizes the buffer and calibrates itself. It does not matter which buffer solution is taken first.

Trueline®

delivers a calibrated analog recorder signal, of course electrically isolated. This provides you with a true pH signal, calibrated for the electrode and without disturbing quantizing levels, permitting undistorted recording of pH curves.

Sockets

Robust gold plated sockets are standard equipment.

EMC

EMC design protects the meter from electromagnetic interferences, ensuring reliable measurement results even under unfavorable conditions.

Numerous practical features allow comfortable and safe pH measurement.

Temperature compensation manual or automatic

Temperature compensation is either automatic with Pt 100 or Pt 1000 temperature probes or manual, as selected.

Standard RS 232 interface

Via the standard RS 232 interface your data can be immediately processed by a computer. Even direct output to a printer is no problem.

Displaymatic® for easier reading

Displaymatic® facilitates readout. If the measured signal changes rapidly, the running characters are blanked in order to allow easy reading. This allows you to read the currently measured value without problems.

Easy-to read LED display for two measured values

The large, bright LED display allows simultaneous readout of two measured values, such as pH and temperature. LED display for alphanumeric characters allows.

Double insulation provides electrical safety in wet locations

The well-designed enclosure has proved successful in practical use. A waterproof membrane keyboard and drain grooves protect the meter from moisture.

The robust, stainless steel covered enclosure resists even strong mechanical stress.



pH/ORP measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



Knick >

■ The facts

Fullcheck® automatic device test

Records for QM documentation
to ISO 9000 and GLP

Trueline® calibrated analog recorder
output, galvanically isolated

Electrode monitoring with
Sensoface® icons

Automatic calibration with
patented Calimatic®

EMC to NAMUR

Electrode statistics

RS 232 interface for computer
and printer

Displaymatic®

Two user-defined measured
value displays, simultaneous

Dead-stop operation

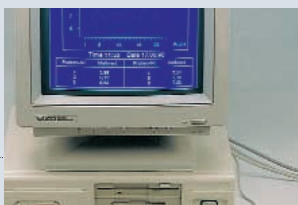
Self-contained clock

Liquid-proof membrane keypad

Robust enclosure

IP 54 protection

3-year warranty



pH/ORP Measurement

Warranty
3 years!

*Defects occurring within 3 years
from delivery date shall be remedied
free of charge at our plant (carriage
and insurance paid by sender).
Sensors and accessories: 1 year*

Laboratory Meters

765 Laboratory pH Meter

■ Keypad

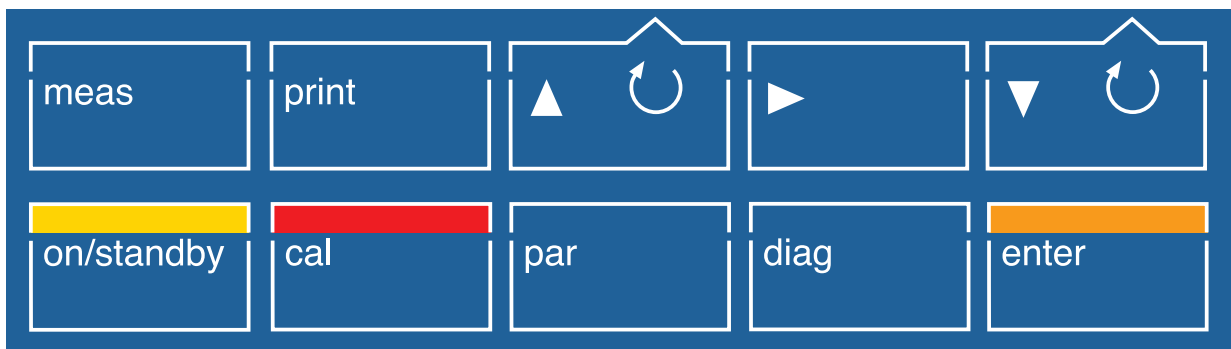
Exit function and return to measuring mode

Print currently measured values or function data

Select line, edit value or select variable

Select parameter or position

Select line, edit value or select variable



On/off (standby)

Activate calibration

Activate parameter setting

Activate diagnostics

Take over value or entry

■ Record printouts

Records of parameter setting, calibration, and diagnostics are particularly helpful for QM documentation to ISO 9000 and GLP.

The records can be printed out directly to any commercially available printer with a serial port at the press of a key.

```

Knick 765 Parameter Setting 15.01.83
-----
Serial Number: 01125464
Software Version: 3.3
Hardware Version: 11
Options :
-----
Manual Temperature: 25.0CEL
Sensoface: On
Displayatic: Off
Buffer Set: -01-
Cal Timer: 48h
Recorder Output: pH
Baud Rate: 4800
Data Bits/Parity: 7 Even
Protocol: On/Off
Interface: Printer
Printer Timer: 0.0min

Time: 12:00
Date: 15.01.
Year: 2003
    
```

```

Knick 765 Diagnostics 14.01.83
-----
Serial Number: 01125464
Software Version: 3.3
Hardware Version: 11
Options :
-----
Last Fullcheck: 14.01.83 14:18

ROM: -ok-
PRAM: -ok-
EEPROM: -ok-
Amplifier: -ok-
Impedance: -ok-
Display: -tested-
Keys: -ok-

Sensoface(++/oo/--)

Zero Point/Slope: ++
EL Response Time: ++
Glass Impedance: ++
Drycheck: ++
Cal Timer: ++
-----
Electrode System Data

Zero Point: 7.00pH
Slope: 59.2mV/pH

Next Calibration in 48h
    
```



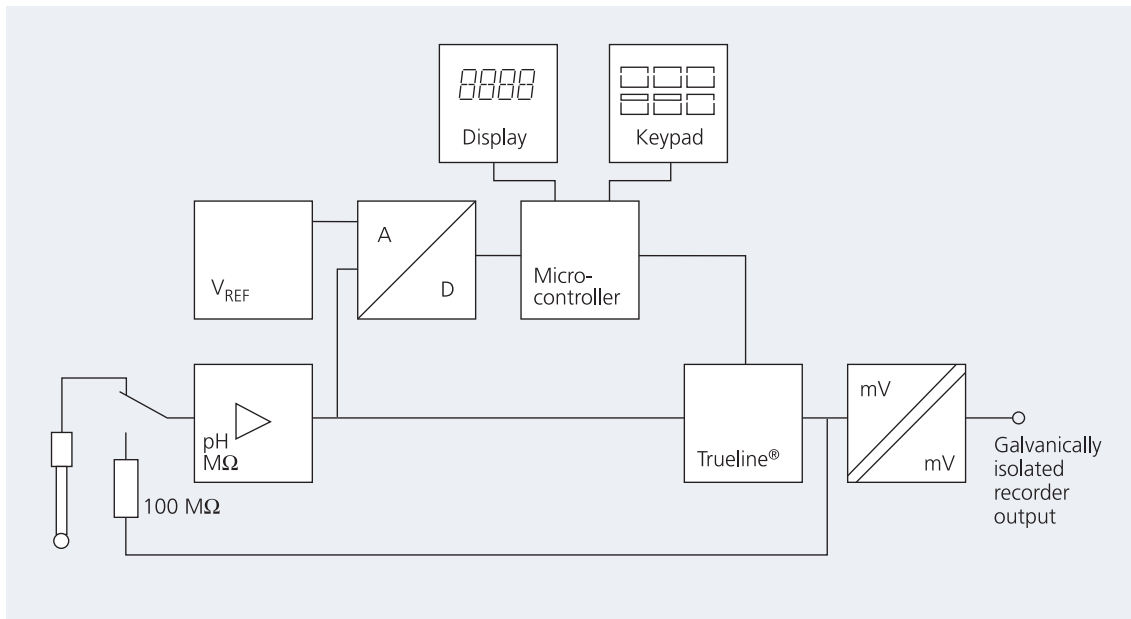
■ Fullcheck® device self-test

For the self test, the electrode is automatically switched off and the input internally connected to the recorder output over a 100 MOhm resistor.

The microcontroller sends defined voltage steps to the recorder output. These are measured with the input amplifier and the A/D converter and compared with a highly accurate reference voltage.

The 100 MOhm resistor at the same time serves as reference for the impedance measuring circuit, which thus is tested as well.

This means, a complete test of the signal path is implemented with a pH meter for the first time. In addition, all memories, the display, and the keypad are tested.



Laboratory Meters

765 Laboratory pH Meter

■ Specifications

Laboratory pH Meter 765

Equipment	Meter with power cord, without electrode
Ranges	pH: -2.00 ... +16.00 / mV: -1999 ... +1999 / °C: -50.0 ... +150.0
Display	Alphanumeric 2 x 4 digits, 14-segment LED, 13 mm high characters, measurement symbols pH/mV/°C/man, 3 Sensoface® status indicators inform on the condition of electrode and equipment (GLP) ³⁾
Measuring cycle	Approx. 1/sec
Accuracy ¹⁾	pH: <0.01 / mV: <0.1 % ±0.3 mV / °C: <0.3 K
Input	DIN 19262
Input resistance	>1 x 10 ¹² Ohm
Input current (20 °C) ²⁾	<1 x 10 ⁻¹² A
Temperature coefficient	<0.1 count/K
Electrode standardization	Calimatic® automatic calibration and buffer recognition (German patent 29 37 227) For buffer sets, see Page 65, permitted calibration ranges: Zero: pH 6 ... 8 Slope: 47 ... 61 mV/pH (25 °C) Nominal zero/slope/V _{iso} [*]) Zero: pH 0 to 14 Slope: 25 ... 61 mV/pH V _{iso} : -500 ... +500 mV
(Option 346)	
Electrode monitoring	Sensoface® evaluates zero, slope, response time, and glass impedance of the electrode, as well as the calibration interval, electrode condition displayed as good / average / poor, can be disabled Cal timer monitors the calibration interval
Fullcheck® device self-test	Tests complete measurement electronics incl. analog output, segment and keypad test in diagnostics mode, automatic short-check at power-on
Records	Records of parameter setting, calibration, and diagnostics, records for QM documentation to ISO 9000 and GLP ³⁾ , retrievable in diagnostics mode or via interface (printer)
Displaymatic®	Digit suppression according to signal change, can be disabled
Temperature compensation	Pt 100 / Pt 1000, automatic selection / manual: -50.0 ... +150.0 °C [*])
Dead stop current	-10 µA
Recorder output [*])	Galvanically isolated mV: 1 mV/mV / pH: 100 mV/pH / °C: 10 mV/°C
Interface	RS 232 without control lines, galvanically isolated, can be used either as printer or computer interface, Baud rate: 600 / 1200 / 2400 / 4800 / 9600 [*]) Data formats: 7 Bit, even/odd parity [*]) 8 Bit, no parity [*]) Protocol: none, xon/xoff [*]) Stop bits: 1

■ Specifications

continued – Laboratory pH Meter 765

Software	Control of the Model 765 pH Meter is integrated in the automation software for lab meters "labworldsoft" (Fisher Scientific) for display and control of device functions for Version 4.0 or higher.
Printer control	For standard printer with serial port, printing at keystroke, via print interval timer 0.1 ... 999.9 min*), or external floating contact
Clock	Real-time clock with date, self-contained
Calibration data storage	Automatic storage of calibration data, self-contained
Data retention	Parameters, statistics, and factory settings: >10 years (EEPROM) Clock: reserve power >1 year (battery-backed)
Electrode statistics	Storage of zero and slope of first calibration, as well as data of last 3 calibrations with time and date stamp, self-contained, output via interface to printer or computer
Protection against electrical shock	Protective separation as defined in DIN 57100 / VDE 0100 Part 410 and DIN VDE 0106 Part 101, power supply against all other inputs and outputs, in accordance with the NAMUR recommendation "Extra-low voltage circuits with protective separation"
EMC directive	89/336/EEC
Standards	EN 61326 / VDE 0843 Part 20: 2002-3
Ambient temperature	0 ... +45 °C
Storage and transport temp	-20 ... +70 °C
Power supply	230 V -15 % +10 %, 48 ... 62 Hz, <10 VA, Option 363: 115 V AC
Protection class	II
Sensor connection	The meter allows connection of any commercial electrodes with DIN plug or banana plug
Enclosure	Glass-reinforced polyamide 12, stainless steel cover, IP 54 protection, prepared for connecting ZU 6954 attachable stand
Dimensions (W x H x D)	244 x 95 x 255 mm
Weight	Approx. 2 kg

*1) User defined 1) ±1 count

2) 45 °C: factor 10 3) Good Laboratory Practice

Buffer sets

Buffer set – 00 –	Knick technical buffers, nominals 25 °C: 2.00/4.01/7.00/9.21
Buffer set – 01 –	Mettler-Toledo (Ingold) technical buffers, nominal values 25 °C: 2.00/4.01/7.00/9.21
Buffer set – 02 –	Merck, Riedel, nominal values 20 °C: 2.00/4.00/7.00/9.00/12.00
Buffer set – 03 –	Technical buffer solutions to DIN 19 267, nominal values 25 °C: 1.09/3.06/4.65/6.79/9.23/12.75
Buffer set – 04 –	DIN 19 266 and NIST (NBS), nominal values 25 °C: 1.679/4.006/6.865/9.180/12.454
Buffer set – 05 –	Merck, Riedel, nominal values 20 °C: 1.00/3.00/6.00/8.00/10.00/13.00
Buffer set – 06 –	Merck, nominal values 20 °C: 4.66/6.88/9.22
Buffer set – 07 –	Ciba (94), nominal values: 2.06/4.00/7.00/10.00
Buffer set – 10 –	Mettler-Toledo (USA), nominal values 25 °C: 4.00/7.00/10.01

Laboratory Meters

■ Specifications Accessories

Printer

Type	Matrix printer
Interface	Serial RS 232 port
Paper	Standard paper, width: 57.5 mm (2.25 inches)
Baud rate	4800 bauds
Data bits	7, 1 stop bit
Parity	Even
Protocol	No
Power supply	230 V AC $\pm 10\%$
Dimensions (W x H x D)	197 x 73 x 153 mm
Weight	Approx. 1.2 kg (incl. power pack)

Order No.: ZU 0244

Stand

Material	Pillar: anodized aluminum; carriage and base: polyamide 12 glass reinforced; Beaker stop, vertical stop, and electrode clasp: stainless steel
Carriage stroke	190 mm
Clamping possibilities Stop for sample beakers	2 x 12 ± 0.5 mm; 1 x 4 ... 14 mm; 1 x 6 ... 16 mm from \varnothing 30 ... 150 mm
Beaker height	Up to 130 mm
Dimensions (W x H x D)	130 x 300 x 145 mm
Weight	Approx. 410 g

Order No.: ZU 6954

Plug-in power pack for immersion stirrer

Power supply	230 V AC -15% $+6\%$ <8 VA
Cable length	2 m
Weight	Approx. 380 g

Order No.: ZU 6956

Immersion stirrer

Material	Enclosure: PVC; impeller and shaft: stainless steel
Dimensions	Unit: 250 x \varnothing 25/12 mm; impeller: \varnothing 12 mm; immersion depth: approx. 90 mm
Weight	Approx. 140 g

Order No.: ZU 6955



Combination pH electrodes for lab and field units

The SE 100 and SE 103 electrodes with a glass body are combination electrodes for standard applications in the lab. The Model SE 100 has an integrated Pt 1000 temperature probe. The Model SE 103 with its high-temperature dissipation system is suitable for measurements in media up to 100 °C.

For use in rougher environments, Knick offers the SE 101 electrode with plastic body. It is also equipped with an integrated Pt 1000 temperature probe. In addition, Knick also offers the SE 104 puncture electrode. This thin, gel-filled combination electrode is particularly robust and insensitive to pollution. Therefore, it is suited especially for measurements in semi-solid substances such as meat or cheese.







■ Specifications Combination pH electrodes

Combination pH electrodes	SE 100	SE 101	SE 103	SE 104
Temperature probe	Pt 1000	Pt 1000	–	–
Body material	Glass	Plastic (PEEK)	Glass	Plastic (PEEK)
Body length	165 mm	110 mm	165 mm	99 mm
Body diameter	12 mm	12 mm	12 mm	16 mm
Junction	Ceramic	2-hole junction	Ceramic	Hole junction
Electrolyte	3 mol/l KCl, refillable	Polymer	3 mol/l KCl, refillable	Polymer
pH measurement range	0 ... 14	0 ... 14	0 ... 14	2 ... 11
Temperature range	0 ... 80 °C	0 ... 80 °C	0 ... 100 °C	0 ... 80 °C
Recommended temp probe	Integrated	Integrated	ZU 6959	ZU 0156
Remarks	–	–	High-temperature dissipation system	Puncture electrode








Laboratory Meters

■ Product line Laboratory pH meters and combination pH electrodes



765 Laboratory pH Meter		Order No.
	Unit with power cord, without electrode	765
Set		
	765 Laboratory pH Meter, SE 100 pH/Pt 1000 combination electrode, ZU 6954 attachable stand and ZU 6928 buffer set (no further optional equipment possible)	765-Set
Options		
Power supply	115 V AC	363
Electrode zero point	nominal electrode zero point and slope user defined	346
	pH/Pt 1000 combination electrode (Glass body, length 165 mm)	SE 100
	pH/Pt 1000 combination electrode (Plastic body, length 110 mm)	SE 101
	Combination pH electrode (Glass body, length 165 mm)	SE 103
	Combination pH puncture electrode (Plastic body, length 99 mm)	SE 104

■ Product line Accessories

			Order No.
	Attachable stand	Besides the immersion stirrer, the attachable stand can hold three sensors of any kind. The adjustable stops prevent damage of sensor and beaker glass. Time-consuming adjustment during sample changes has been eliminated. An integrated cable duct does away with the "spaghetti cables" on your benchtop. For ZU 6955 immersion stirrer and three sensors, directly connected to the meter.	ZU 6954
	Immersion stirrer	The immersion stirrer reduces electrode response time for measurement and calibration. Precision measurements to DIN 19268 even require stirring. To prevent splattering of test liquid, the stirrer automatically stops as the carriage moves up. The stirrer is supplied via the ZU 6956 plug-in power pack.	ZU 6955
	Plug-in power pack	For immersion stirrer	ZU 6956
	Interface cable	For meter – computer connection (special EMC cable)	ZU 0152
	Lab printer	With the Lab Printer, you can document your measured values either at the press of a key or timer-controlled. Also records for QM documentation to ISO 9000 and GLP can be printed out with a single keystroke. The printer is equipped with a replaceable ribbon cartridge and prints on standard paper. It is connected to the 765 Laboratory pH Meter or the 703 Laboratory Conductivity Meter via ZU 0245 interface cable.	ZU 0244
	Interface cable	For meter – printer connection	ZU 0245

Laboratory Meters

continued – **Product line** Accessories

			Order No.
	Printer paper	For ZU 0244 Lab Printer, 5 rolls	ZU 0249
	Ink ribbon	For ZU 0244 Lab Printer, 5 ribbons	ZU 0250

pH/ORP measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters







Laboratory Meters

Sensors

Fittings

Knick

■ Product line Sensors and buffer solutions

		Order No.
	Pt 1000 temperature probe	For fast response temperature measurements: Monel 2.4360, -10 ... +100 °C, accuracy class A to IEC 751
	Pt 1000 temperature probe	For fast response temperature measurements, with tilted tip for puncture measurements in semi-solid substances: Monel 2.4360, -10 ... 100 °C, pH 0 ... 14, accuracy class A to IEC 751
	Calibration buffer set	With Knick technical buffer solutions, 250 ml each of pH 4.01, pH 7.00, pH 9.21, and KCl solution
	Calibration buffer set	With standard buffer solutions to DIN 19266 and NIST (NBS), 250 ml each of pH 4, pH 7, and KCl solution
	KCl solution	250 ml bottle
	Knick technical buffers	pH 4.01 (set with 30 bags for one calibration each)
		pH 7.00 (set with 30 bags for one calibration each)
		pH 9.21 (set with 30 bags for one calibration each)
		pH 4.01 (1000 ml)
		pH 7.00 (1000 ml)
		pH 9.21 (1000 ml)

Laboratory Meters

Knick >

The Laboratory pH Meter with uncompromising ease of use.

766 Laboratory pH Meter



The 766 Laboratory pH Meter is designed for standard applications in everyday lab routines. It combines practical functionality and easy operation with comprehensive safety functions.

Gaincheck®

Gaincheck® performs a complete instrument check. At a keystroke, it not only checks electrical characteristics, but also display and keypad. At power-on, a short check automatically tests device functions. This ensures the device operability, as part of quality management to ISO 9000 and GLP.

Sensoface®

checks the electrode and provides information on the electrode condition. Zero point, slope, response time, and glass impedance of the electrode are evaluated.

Trueline®

delivers a calibrated analog recorder signal, of course electrically isolated. This provides you with a true pH signal, calibrated for the electrode and without disturbing quantizing levels, permitting undistorted recording of pH curves.

Calimatic®

automatically recognizes the right buffer. It allows calibration at the stroke of a key, providing ease of use and – above all – safety.

You simply immerse the electrode in two buffers of the selected set, no matter which one you take first, and press the cal key. The meter automatically recognizes the buffer and calibrates itself. It does not matter which buffer solution is taken first.

EMC

EMC design protects the meter from electromagnetic interferences, ensuring reliable measurement results even under unfavorable conditions.

Easy operation with five keys

Even with its comprehensive safety functions, the Model 766 remains easy to operate. Just five keys give access to all functions you require for easy and precise routine measurements.

Temperature compensation manual or automatic

Temperature is automatically compensated. A pH/Pt 1000 electrode detects the temperature and the Model 766 automatically calculates it into the measured

value. Of course, you can also measure the temperature using a separate sensor or enter it manually.

Easy-to-read LED display for pH and temperature

The large, bright 14-segment LED display for alphanumeric characters allows simultaneous readout of pH/mV and temperature.

Safe and robust enclosure

The well-designed enclosure has proved successful in practical use. A waterproof membrane keyboard and drain grooves protect the meter from moisture. The robust, stainless steel covered enclosure resists even strong mechanical stress.

**Warranty
3 years!**

*Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors and accessories: 1 year*

pH/ORP measurement

Isolation Amplifiers
Transmitters

Indicators

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Portable Meters

Laboratory Meters

Sensors

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Knick >

■ The facts

Gaincheck® automatic device test

Trueline® calibrated analog recorder output

Electrode monitoring with Sensoface® icons

Automatic calibration with patented Calimatic®

EMC to NAMUR

Simultaneous pH and temperature display

Easy operation

Liquid-proof membrane keypad

Robust enclosure

IP 54 protection

3-year warranty



Laboratory Meters

766 Laboratory pH Meter

■ Keypad

On/off
(standby)

Activate
calibration

Exit function and
return to measuring
mode

Activate
diagnostics

Step through or
edit value



■ Gaincheck® device self-test

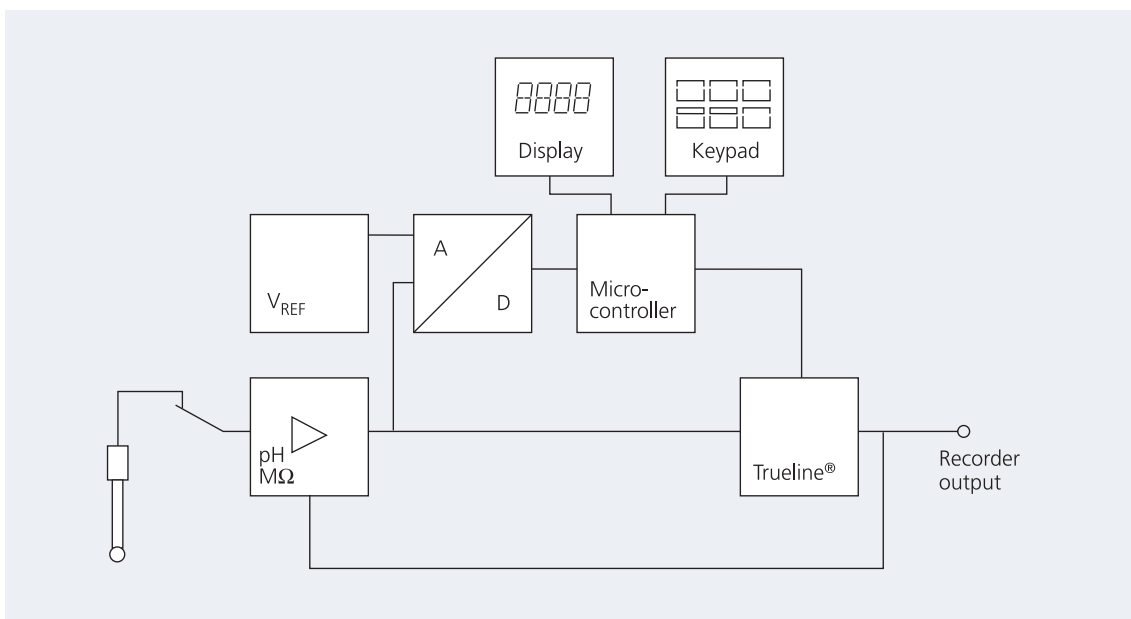
For the self test, the measuring circuit is connected to the recorder output.

The microcontroller sends defined voltage steps to the recorder output. These are measured with the measuring circuit and the A/D converter and compared with a highly accurate reference voltage.

This ensures reliable checking of the signal path. In addition, the Model 766 tests all Sensoface® criteria, all memories, the display, and the keypad.

Gaincheck® allows you to check your instrument's operability for quality management to ISO 9000 and GLP.

Gaincheck® is only available from Knick.



766 Laboratory pH Meter



■ Specifications

Laboratory pH Meter 766

Equipment	Meter with power cord, without electrode
Ranges	pH: -2.00 ... +16.00 / mV: -1999 ... +1999 / °C: -50.0 ... +150.0
Display	Alphanumeric 2 x 4 digits, 14-segment LED, character height 13 mm; Measurement symbols pH/mV/°C/man, 3 Sensoface® icons inform on the condition of electrode and measuring equipment (GLP) ³⁾
Measuring cycle	Approx. 1.5/sec
Accuracy ¹⁾	pH: <0.01 / mV: <0.1 % ±0.3 mV / °C: <0.3 K
Input	DIN 19262
Input resistance	>1 x 10 ¹² Ohm
Input current (20 °C) ²⁾	< 1 x 10 ⁻¹² A
Temperature coefficient	<0.1 count/K
Electrode standardization	Calimatic® automatic calibration and buffer recognition (German patent 29 37 227), For buffer sets, see Page 76, permitted calibration ranges: Zero: pH 6 ... 8 Slope: 47 ... 61 mV/pH (25 °C)
Electrode monitoring	Sensoface® evaluates zero, slope, response time, and glass impedance of the electrode, electrode condition displayed as good / average / poor, can be disabled
Device self-test Gaincheck®	Displays all Sensoface® criteria and electrode data, tests measurement electronics including memories, measured value processing, and recorder output, checks display and keypad during diagnostics, automatic short check at power-on
Temperature compensation	Pt 1000, automatic selection Manual: 0.0 ... +100.0 °C*)
Recorder output*) Trueline®	pH-compensated, no quantizing levels mV: 1 mV/mV pH: 100 mV/pH Automatic matching to measured value setting
Calibration data storage	Automatic storage of calibration data and settings, self-contained
Data retention	>10 years (EEPROM)
Recorder output*)	Galvanically isolated mV: 1 mV/mV / pH: 100 mV/pH / °C: 10 mV/°C
Protection against electrical shock	Protective separation of all extra-low-voltage circuits against power supply to DIN VDE 0100 Part 410 as defined in DIN VDE 0106 Part 101 and according to EN 61010 Part 1

*) User defined 1) ±1 count

2) 45 °C: factor 10 3) Good Laboratory Practice

Laboratory Meters

766 Laboratory pH Meter

■ Specifications

continued – Laboratory pH Meter 766

EMC directive	89/336/EEC
Standards	EN 61326 VDE 0843 Part 20: 2002-3
Ambient temperature	0 ... +45 °C
Storage and transport temp	-20 ... +70 °C
Power supply	230 V -15 % +10 %, 48 ... 62 Hz, <10 VA, Option 363: 115 V AC
Sensor connection	The meter allows connection of any commercial electrodes with DIN plug or banana plug
Enclosure	Glass-reinforced polyamide 12, stainless steel cover, IP 54 protection, prepared for connecting ZU 6954 attachable stand
Dimensions (W x H x D)	244 x 95 x 255 mm
Weight	Approx. 2 kg

Buffer sets

Buffer set – 00 –	Knick technical buffers, nominals 25 °C: 2.00/4.01/7.00/9.21
Buffer set – 01 –	Mettler-Toledo (Ingold) technical buffers, nominal values 25 °C: 2.00/4.01/7.00/9.21
Buffer set – 02 –	Merck, Riedel, nominal values 20 °C: 2.00/4.00/7.00/9.00/12.00
Buffer set – 03 –	Techn. buffer solutions to DIN 19 267, nom. values 25 °C: 1.09/3.06/4.65/6.79/9.23/12.75
Buffer set – 04 –	DIN 19 266 and NIST (NBS), nominal values 25 °C: 1.679/4.006/6.865/9.180/12.454
Buffer set – 05 –	Merck, Riedel, nominal values 20 °C: 1.00/3.00/6.00/8.00/10.00/13.00
Buffer set – 06 –	Merck, nominal values 20 °C: 4.66/6.88/9.22
Buffer set – 07 –	Ciba (94), nominal values: 2.06/4.00/7.00/10.00
Buffer set – 10 –	Mettler-Toledo (USA), nominal values 25 °C: 4.00/7.00/10.01

■ Specifications Accessories

Stand

Order No.: ZU 6954

Material

Pillar: anodized aluminum; carriage and base: polyamide 12 glass reinforced;
Beaker stop, vertical stop, and electrode clasp: stainless steel

Carriage stroke

190 mm

Clamping possibilities
Stop for sample beakers

2 x 12 ±0.5 mm; 1 x 4 ... 14 mm; 1 x 6 ... 16 mm
from Ø 30 ... 150 mm

Beaker height

Up to 130 mm

Dimensions (W x H x D)

130 x 300 x 145 mm

Weight

Approx. 410 g

Plug-in power pack for immersion stirrer

Order No.: ZU 6956

Power supply

230 V AC -15 % +6 % <8 VA

Cable length

2 m

Weight

Approx. 380 g

Immersion stirrer

Order No.: ZU 6955

Material

Enclosure: PVC; impeller and shaft: stainless steel

Dimensions

Unit: 250 x Ø 25/12 mm; impeller: Ø 12 mm; immersion depth: approx. 90 mm

Weight

Approx. 140 g

Laboratory Meters

Combination pH electrode for lab and field units

The SE 100 and SE 103 electrodes with a glass body are combination electrodes for standard applications in the lab. The Model SE 100 has an integrated Pt 1000 temperature probe. The Model SE 103 with its high-temperature dissipation system is suitable for measurements in media up to 100 °C.

For use in rougher environments, Knick offers the SE 101 electrode with plastic body. It is also equipped with an integrated Pt 1000 temperature probe. In addition, Knick also offers the SE 104 puncture electrode. This thin, gel-filled combination electrode is particularly robust and insensitive to pollution. Therefore, it is suited especially for measurements in semi-solid substances such as meat or cheese.

■ Specifications Combination pH electrodes

Combination pH electrodes	SE 100	SE 101	SE 103	SE 104
Temperature probe	Pt 1000	Pt 1000	–	–
Body material	Glass	Plastic (PEEK)	Glass	Plastic (PEEK)
Body length	165 mm	110 mm	165 mm	99 mm
Body diameter	12 mm	12 mm	12 mm	16 mm
Junction	Ceramic	2-hole junction	Ceramic	Hole junction
Electrolyte	3 mol/l KCl, refillable	Polymer	3 mol/l KCl, refillable	Polymer
pH measurement range	0 ... 14	0 ... 14	0 ... 14	2 ... 11
Temperature range	0 ... 80 °C	0 ... 80 °C	0 ... 100 °C	0 ... 80 °C
Recommended temp probe	–	–	ZU 6959	ZU 0156
Remarks	–	–	High-temperature dissipation system	Puncture electrode






■ **Product line** Laboratory pH meters and combination pH electrodes

		Order No.
	766 Laboratory pH Meter	
	Unit with power cord, without electrode	766
Set A		
	766 Laboratory pH Meter with SE 101 pH/Pt 1000 combination electrode, (combination pH/Pt 1000 electrode, plastic, 110 mm)	766-SET A
Set B		
	766 Laboratory pH Meter with SE 100 pH/Pt 1000 combination electrode, (combination pH/Pt 1000 electrode, glass, 165 mm)	766-SET B
Options		
	Power supply	115 V AC 363
	pH/Pt 1000 combination electrode	Glass body, length 165 mm SE 100
	pH/Pt 1000 combination electrode	Plastic body, length 110 mm SE 101
	Combination pH electrode	Glass body, length 165 mm SE 103
	Combination pH puncture electrode	Plastic body, length 99 mm SE 104

Laboratory Meters

■ Product line Accessories

			Order No.
	Attachable stand	Besides the immersion stirrer, the attachable stand can hold three sensors of any kind. The adjustable stops prevent damage of sensor and beaker glass. Time-consuming adjustment during sample change has been eliminated. An integrated cable duct does away with the "spaghetti cables" on your benchtop. For immersion stirrer and three sensors. Fixed directly to the meter.	ZU 6954
	Immersion stirrer	The immersion stirrer reduces electrode response time for measurement and calibration. Precision measurements to DIN 19268 even require stirring. To prevent splattering of test liquid, the stirrer automatically stops as the carriage moves up. The stirrer is supplied via the ZU 6956 plug-in power pack.	ZU 6955
	Plug-in power pack	For immersion stirrer	ZU 6956

pH/ORP measurement

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters







Laboratory Meters

Sensors

Fittings

Knick

■ Product line Sensors and buffer solutions

		Order No.
	Pt 1000 temperature probe	For fast response temperature measurements: Monel 2.4360, -10 ... +100 °C), accuracy class A to IEC 751
	Pt 1000 temperature probe	For fast response temperature measurements, with tilted tip for puncture measurements in semi-solid substances: Monel 2.4360, -10 ... 100 °C, pH 0 ... 14, accuracy class A to IEC 751
	Calibration buffer set	With Knick technical buffer solutions, 250 ml each of pH 4.01, pH 7.00, pH 9.21, and KCl solution
	Calibration buffer set	With standard buffer solutions to DIN 19266 and NIST (NBS), 250 ml each of pH 4, pH 7, and KCl solution
	KCl solution	250 ml bottle
	Knick technical buffers	pH 4.01 (set with 30 bags for one calibration each)
		pH 7.00 (set with 30 bags for one calibration each)
		pH 9.21 (set with 30 bags for one calibration each)
		pH 4.01 (1000 ml)
		pH 7.00 (1000 ml)
		pH 9.21 (1000 ml)

Laboratory Meters

Knick >

The requirements for lab measurements become stricter every day. Quality assurance and measurement documentation in accordance with GLP are a must in many areas.

With its numerous safety functions and record printouts at keystroke, the 703 Laboratory Conductivity Meter considerably simplifies this work for you.

Fullcheck®

automatically checks the device functions during power-on. Also during operation, a complete instrument check can be carried out at a single keystroke. Here, also display and keypad are checked besides the electrical characteristics.

Record printouts

With record printouts of the device self-test, the calibration, and the parameter settings, it is possible (as part of quality management to ISO 9000 and GLP) to document the operability and the regular maintenance and calibration of the meter.

Sensoface®

Sensoface® monitors the sensor and measuring equipment and provides information on sensor selection and handling. It reports clock memory loss and requests regular checks in accordance with GLP.

Calibration

Unknown cell constants can easily be determined with a standard calibration. The meter automatically takes the TC of the calibration solution into consideration, calculates the cell constant and

703 Laboratory Conductivity Meter



displays it. Of course, a known cell constant can also be entered directly.

Analog output

The galvanic isolation of the recorder output prevents the measured values from being influenced by the connected peripherals. Measurement continues unimpaired.

EMC

EMC design protects the meter from electromagnetic interferences, ensuring reliable measurement results even under unfavorable conditions.

This makes the Model 703 the first laboratory conductivity meter that completely fulfills the EMC recommendations of NAMUR.

The Model 703 offers a wide range of practical features to meet the numerous requirements of everyday measuring tasks.

Automatic switchover to 4-electrode or 2-electrode operation

With the Model 703 you can use either 4-electrode or 2-electrode sensors. The measuring input is automatically switched to the appropriate operating mode.

Temperature compensation manual or automatic

Temperature compensation takes place either automatically with Pt 1000/NTC 30 kOhm temperature probes or manually.

Standard RS 232 interface

Via the standard RS 232 interface your data can be immediately processed by a computer. Even direct output to a printer is no problem.

GLP records at the press of a key

Records of the parameter setting, calibration, and device diagnostics can be output directly to a printer. This provides you with comprehensive GLP-compatible documentation at the press of a key.

Automatic adjustment of display range

The meter automatically selects the display range with the greatest possible resolution. Of course, the desired display range can also be specified manually.

Easy-to read LED display for two measured values

The large, bright LED display allows simultaneous readout of two measured values, such as conductivity and temperature. The 14-segment display can show alphanumeric characters.

Double insulation provides electrical safety in wet locations

The well-designed enclosure has proved successful in practical use. A waterproof membrane keyboard and drain grooves protect the meter from moisture. The robust, stainless steel covered enclosure resists even strong mechanical stress.

Conductivity Measurement

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■ The facts

Measurement ranges from
0.000 $\mu\text{S}/\text{cm}$ to 2000 mS/cm

<1.000 $\mu\text{S}/\text{cm}$... >1000 mS/cm
with one sensor

Records for QM documentation
to ISO 9000 and GLP

Calibrated analog recorder out-
put, galvanically isolated

Sensiface® monitoring of sensor
and measuring equipment

Automatic calibration with
standard solutions

EMC to NAMUR

RS 232 interface for computer
and printer



Two measured value displays,
simultaneous

Self-contained clock

Liquid-proof membrane keypad

Robust enclosure

IP 54 protection

3-year warranty



Conductivity Measurement

Warranty
3 years!

Defects occurring within 3 years
from delivery date shall be remedied
free of charge at our plant (carriage
and insurance paid by sender).
Sensors and accessories: 1 year



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■ Keypad

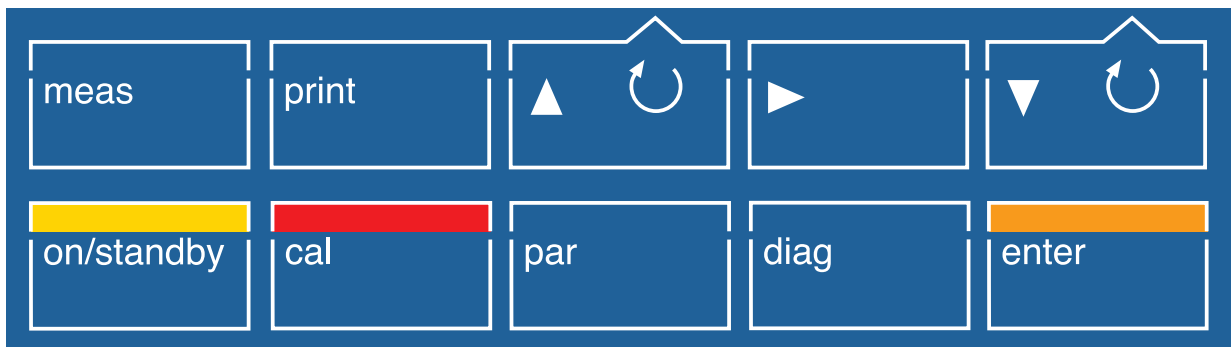
Exit function and return to measuring mode

Print currently measured values or function data

Select line, edit value or select variable

Select parameter or position

Select line, edit value or select variable



On/off (standby)

Activate calibration

Activate parameter setting

Activate diagnostics

Take over value or entry

■ Record printouts

Records of parameter setting, calibration and diagnostics are particularly helpful for QM documentation to ISO 9000 and GLP.

The records can be printed out directly to any commercially available printer with serial port.

```

Knick 703 Calibration 19.03.03
-----
Serial Number: 01108329
Software Version: 1.3
Hardware Version: 01
Options : No
-----
Last Calibration: 19.03.03 10:03

Data Entry
-----

Cell System Data
Cell Constant: 1.240/ca
    
```

```

Knick 703 Diagnostics 19.03.03
-----
Serial Number: 01108329
Software Version: 1.3
Hardware Version: 01
Options : No
-----
Last Fullcheck: 19.03.03 09:55

ROM: -ok-
PRAM: -ok-
EEPROM: -ok-
Output: -ok-
Amplifier: -ok-
Accumulator: -ok-
Display: -tested-
Keys: -ok-

Sensoface(++/oo/-)

Cell Range: ++
TC Temperature: ++
GLP Timer: ++
Accumulator: ++
Date Check: ++
    
```

```

Knick 703 Parameter Setting 19.03.03
-----
Serial Number: 01108329
Software Version: 1.3
Hardware Version: 01
Options : No
-----
Manual Temperature: 25.0CEL
Temperature Compensation: On
Temperature Coefficient: 2.10%/K
Reference Temperature: 25CEL
Sensoface: On
Range: Fixed
Cal-Solution: NaCl 0.1Mol
GLP Timer: 0h
Recorder Output: 1uW/aS
Baud Rate: 4800
Data Bits/Parity: 7 Even
Protocol: No
Interface: Printer
Printer Timer: 0.0min

Time: 10:47
Date: 19.03.
Year: 2003
    
```

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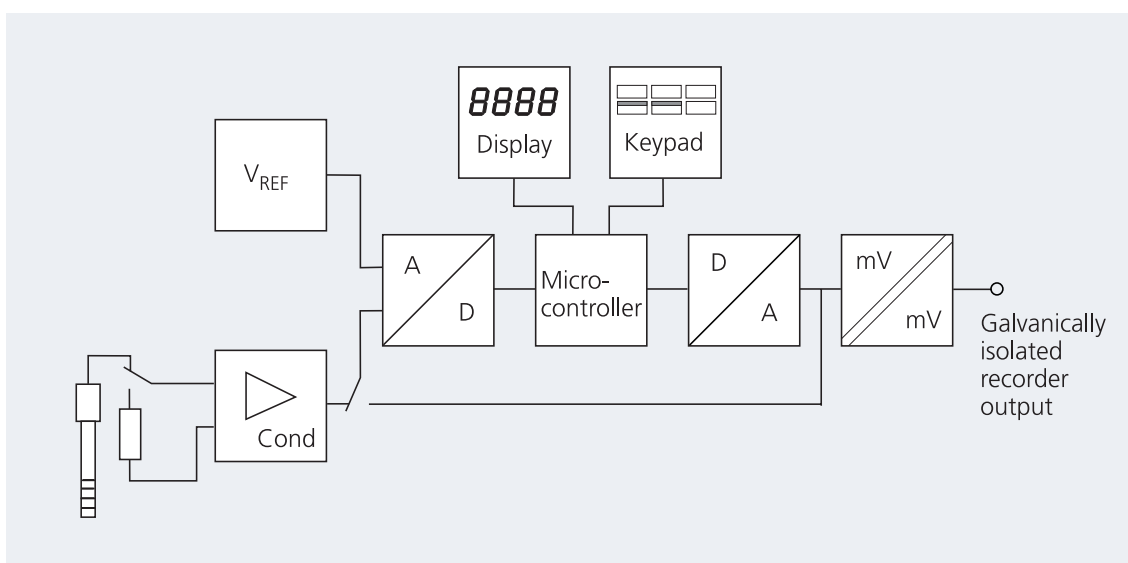
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■ Fullcheck® device self-test

For the self test the sensor is automatically switched off and the input switched over to a reference resistor. The conductivity measuring circuit is automatically checked internally.

The microcontroller sends defined voltage steps to the recorder output. These are measured with the A/D converter and compared with a highly accurate reference voltage.

This means, a complete test of the signal path is implemented with a conductivity meter for the first time. In addition, all memories, the display, and the keypad are tested.



Laboratory Meters

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■ Specifications

703 Laboratory Conductivity Meter

Equipment	Meter with power cord, without sensor
Ranges	Cond: 0.000 ... 9.999 $\mu\text{S}/\text{cm}$; 00.00 ... 99.99 $\mu\text{S}/\text{cm}$; 000.0 ... 999.9 $\mu\text{S}/\text{cm}$; 0.000 ... 9.999 mS/cm ; 00.00 ... 99.99 mS/cm ; 000.0 ... 999.9 mS/cm ; 0000 ... 2000 mS/cm ; auto-ranging or manual preset*); $^{\circ}\text{C}$: -50.0 ... +150.0
Display	Alphanumer. 2 x 4-digit, 14-segment LED, character height 13 mm, measurement symbols: 20 $^{\circ}\text{C}$, 25 $^{\circ}\text{C}$, $\mu\text{S}/\text{cm}$, mS/cm , $\%/K$, $^{\circ}\text{C}$, Time, 3 Sensoface [®] icons inform on sensor and measuring equipment (GLP)
Measuring cycle	Approx. 1.5/sec
Measuring frequencies	Approx. 40 Hz to 2 kHz, automatic adjustment by conductance
Resolution	Up to 0.001 $\mu\text{S}/\text{cm}$
Accuracy ¹⁾	Cond: <0.5 % meas. value. ± 2 counts $^{\circ}\text{C}$: 0.3 K
Reproducibility ¹⁾	<0.1 % meas. val.
Temperature compensation	-50 ... +150 $^{\circ}\text{C}$; Pt 1000/NTC 30 kOhm (autom. selection) or manual, Linear TC characteristic 0.00 ... +9.99 $\%/K$, ref. temperature 20 $^{\circ}\text{C}$ /25 $^{\circ}\text{C}$ selectable
Adm. cell constant	0.001 ... 199.9 cm^{-1} , adjustable
Sensor standardization	Operating modes – Automatic by determining the cell constant with NaCl or KCl solution Calibration solutions: KCl 0.01 mol/l; 0.1 mol/l; 1 mol/l; NaCl 0.01 mol/l; 0.1 mol/l; saturated – Direct entry of cell constant
Monitoring of sensor and equipment (GLP)	Sensoface [®] provides information: – for selection of 2-electrode sensors – on too great a difference between reference and measuring temperature – for handling of 4-electrode sensors – on clock memory loss – in case of irregular checking of measuring equipment Optical display: good/average/poor
Device self-test	Test of measuring electronics including recorder output, segment and keypad test, RAM, EPROM, and EEPROM test during diagnostics, automatic short check at power-on
GLP records (ISO 9000)	Parameter settings, calibration, device diagnostics
Recorder output	Galvanically isolated (isolation voltage: 40 V DC, 20 V AC) Cond: 1 $\text{mV}/\mu\text{S} \cdot \text{cm}^{-1}$; 1 $\text{mV}/\text{mS} \cdot \text{cm}^{-1}$; $^{\circ}\text{C}$: 10 $\text{mV}/^{\circ}\text{C}$ user-defined for printer control
Interface	RS 232 without control lines, galvanically isolated (isolation voltage: 40 V DC, 20 V AC), user-definable as printer or computer interface, Baud rate: 600 / 1200 / 2400 / 4800 / 9600*) Data bits/parity: 7/Even, 7/Odd, 8/No*) Protocol: none, XON/XOFF*) Stop bits: 1
Software	Control of the Model 703 Laboratory Conductivity Meter is integrated in the automation software for lab meters "labworldsoft" (Fisher Scientific) for display and control of device functions for Version 4.0 or higher.



■ Specifications

continued – 703 Laboratory Conductivity Meter

Clock	Real-time clock with date, self-contained
Calibration data storage	Automatic storage of cell constant and calibration procedure with time and date stamp, self-contained
Data retention	Parameters, statistics, and factory settings: >10 years (EEPROM) Clock: reserve power >1 year (battery-backed)
Protection against electrical shock	Protective separation as defined in DIN 57100 / VDE 0100 Part 410 and DIN VDE 0106 Part 101, power supply against all other inputs and outputs, in accordance with the NAMUR recommendation "Extra-low voltage circuits with protective separation"
EMC directive	89/336/EEC
Standards	EN 61326 / VDE 0843 Part 20: 2002-3
Ambient temperature	0 ... +45 °C
Storage and transport temp	-20 ... +70 °C
Power supply	230 V -15 % +10 %, 48 ... 62 Hz, <10 VA, Option 363: 115 V AC
Sensor connection	The meter allows connection of any 2-electrode sensors with banana plug. Special diode plug for 4-electrode sensors.
Enclosure	Glass-reinforced polyamide 12, stainless steel cover, IP 54 protection, prepared for connecting ZU 6954 attachable stand
Dimensions (W x H x D)	244 x 95 x 255 mm
Weight	Approx. 2 kg

*1) User defined ¹⁾ ±1 count

²⁾ 45 °C: factor 10

³⁾ Good Laboratory Practice

Laboratory Meters

■ Specifications Accessories

Printer

Type	Matrix printer
Interface	Serial RS 232 port
Paper	Standard paper, width: 57.5 mm (2.25 inches)
Baud rate	4800 bauds
Data bits	7, 1 stop bit
Parity	Even
Protocol	No
Power supply	230 V AC $\pm 10\%$
Dimensions (W x H x D)	197 x 73 x 153 mm
Weight	Approx. 1.2 kg (incl. power pack)

Order No.: ZU 0244

Stand

Material	Pillar: anodized aluminum; carriage and base: polyamide 12 glass reinforced; Beaker stop, vertical stop, and electrode clasp: stainless steel
Carriage stroke	190 mm
Clamping possibilities Stop for sample beakers	2 x 12 ± 0.5 mm; 1 x 4 ... 14 mm; 1 x 6 ... 16 mm from \varnothing 30 ... 150 mm
Beaker height	Up to 130 mm
Dimensions (W x H x D)	130 x 300 x 145 mm
Weight	Approx. 410 g

Order No.: ZU 6954

Plug-in power pack for immersion stirrer

Power supply	230 V AC -15% $+6\%$ <8 VA
Cable length	2 m
Weight	Approx. 380 g

Order No.: ZU 6956

Immersion stirrer

Material	Enclosure: PVC; impeller and shaft: stainless steel
Dimensions	Unit: 250 x \varnothing 25/12 mm; impeller: \varnothing 12 mm; immersion depth: approx. 90 mm
Weight	Approx. 140 g

Order No.: ZU 6955



Conductivity sensors for lab and portable meters

SE 202 2-electrode sensor with integrated temperature probe (NTC 30 kOhm) and flow cell. For measurement in low-conductivity solutions such as ultrapure water and boiler feed water, e. g. for monitoring water desalination plants.

SE 204 4-electrode sensor with integrated temperature probe (NTC 30 kOhm). For measurement in natural waters such as surface water or drinking water, in aqueous solutions such as acid and alkaline solutions and for salinity determination of sea water.

With the ZU 6985 4-electrode sensor from Knick, a lab-quality universal conductivity sensor is available. The sensor operates reliably over a broad range from $<1.00 \mu\text{S}/\text{cm}$ to $>1000 \text{ mS}/\text{cm}$. It is equipped with a quick-reacting Pt 1000 temperature probe. It is provided with a glass/platinum measuring system with an easy-to-replace KPG® tube. It is simple to clean and requires no platinization.

■ Specifications Conductivity sensors


Conductivity sensors	SE 202	SE 204	ZU 6985
Number of electrodes	2	4	4
Body	Stainless steel 1.4571	Epoxy, black	Glass
Electrode material	Stainless steel 1.4571	Graphite	Platinum, bare
Body length	120 mm	120 mm	110 mm
Body diameter	12 mm	15.3 mm	Tube 16 mm
Temperature probe	NTC (30 kOhm): -5 ... +100 °C	NTC (30 kOhm): -5 ... +100 °C	Pt 1000: -20 ... +100 °C
Immersion depth	Min.: 30 mm, max.: total length incl. Cable	Min.: 36 mm, max.: total length incl. Cable	Min. 60 mm Max. 80 mm
Pressure resistance	2 bars	2 bars	2 bars
Cell constant	$0.100 \text{ cm}^{-1} \pm 2 \%$	$0.475 \text{ cm}^{-1} \pm 1.5 \%$	$1.19 \text{ cm}^{-1} \pm 1 \%$
Ranges	0.01 ... 200 $\mu\text{S}/\text{cm}$	1 $\mu\text{S}/\text{cm}$... 500 mS/cm	1 $\mu\text{S}/\text{cm}$... 1000 mS/cm
Remarks	Incl. flow cell	-	-

Order No.

SE 202
SE 204
ZU 6985


Laboratory Meters

■ **Product line** Laboratory conductivity meters and conductivity sensors

Lab Conductivity Meter 703		Order No.
	Unit with power cord, without sensor	703
Options		
Power supply	115 V AC	363
	2-electrode sensor With stainless steel body incl. flow cell (ZU 0298 adapter required)	SE 202
	4-electrode sensor With epoxy body (ZU 0298 adapter required)	SE 204
	4-electrode sensor With glass body	ZU 6985

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■ Product line Calibration solutions, spare parts, and further accessories

		Order No.
	Temperature probe	Pt 1000 ZU 6959
	Conductivity standard	For determination and checking of cell constants. 1 ampoule for producing 1000 ml 0.1 mol/l NaCl solution (12,88 mS/cm) ZU 6945
		For determination and checking of cell constants. Conductivity 12.88 mS/cm ± 1 % (0.1 mol/l KCl), 250 ml solution, ready for use ZU 0348
		For determination and checking of cell constants. Conductivity 1413 μ S/cm ± 1 % (0.01 mol/l KCl), 250 ml solution, ready for use ZU 0349
		For determination and checking of cell constants. Conductivity 147 μ S/cm ± 1 %, 500 ml solution, ready for use ZU 0702
		For determination and checking of cell constants. Low conductivity 15 μ S/cm ± 5 %, 300 ml solution, ready for use ZU 0350
	KPG® tube	For ZU 6985 4-electrode sensor, incl. O-ring ZU 0180
	Replacement flow cell	For SE 202 2-electrode sensor ZU 0284
	Adapter	For connecting the SE 202 and SE 204 sensors to the 703 Laboratory Conductivity Meter ZU 0298
	Attachable stand	Besides the immersion stirrer, the attachable stand can hold three sensors of any kind. The adjustable stops prevent damage of sensor and beaker glass. Time-consuming adjustment during sample changes has been eliminated. An integrated cable duct does away with the "spaghetti cables" on your benchtop. For ZU 6955 immersion stirrer and three sensors, directly connected to the meter. ZU 6954

Laboratory Meters

continued – **Product line** Calibration solutions, spare parts, and further accessories



Immersion stirrer

The immersion stirrer reduces sensor response time for measurement and calibration. Precision measurements to DIN 19268 even require stirring. To prevent splattering of test liquid, the stirrer automatically stops as the carriage moves up. The stirrer is supplied via the ZU 6956 plug-in power pack.

Order No.

ZU 6955

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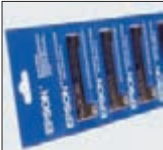
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■ **Product line** Accessories

			Order No.
	Plug-in power pack	For immersion stirrer	ZU 6956
	Interface cable	For meter – computer connection (special EMC cable)	ZU 0152
	Lab printer	With the Lab Printer, you can document your measured values either at the press of a key or timer-controlled. Also records for QM documentation to ISO 9000 and GLP can be printed out with a single keystroke. The printer is equipped with a replaceable ribbon cartridge and prints on standard paper. It is connected to the 765 Laboratory pH Meter or the 703 Laboratory Conductivity Meter via interface cable.	ZU 0244
	Interface cable	For meter – printer connection	ZU 0245
	Printer paper	For ZU 0244 Lab Printer, 5 rolls	ZU 0249
	Ink ribbon	For ZU 0244 Lab Printer, 5 ribbons	ZU 0250

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**Knick
Elektronische Messgeräte
GmbH & Co. KG**

Beuckestraße 22, 14163 Berlin
P.O. Box 37 04 15, D-14134 Berlin
Germany

Phone: +49 (0)30-801 91-0
Fax: +49 (0)30-801 91-200
E-Mail: knick@knick.de
Internet: www.knick.de