
Operating Instructions



ProLine
Conductivity meter B250



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1. Introduction

The QIS ProLine conductivity meter is an instrument offering far more than simple conductivity measurements without breaking your budget. It is an instrument with many advantages:

- ProLine saves you time. The user interface is designed in such a logical way that you will no longer need to consult your user manual.
- ProLine can be battery operated. Thanks to this option you can now easily move your instrument from one working area to another even if no power supply is available.
- ProLine has additional advantages. Our Service Option provides regular equipment qualifications that will improve the reliability and accuracy of your instrument.

2. Safety measures

Measures for your protection



- Never work in an environment subject to explosion hazards! The housing of the instrument is not gas tight (explosion hazard due to spark formation, corrosion caused by the ingress of gases).



- When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules!

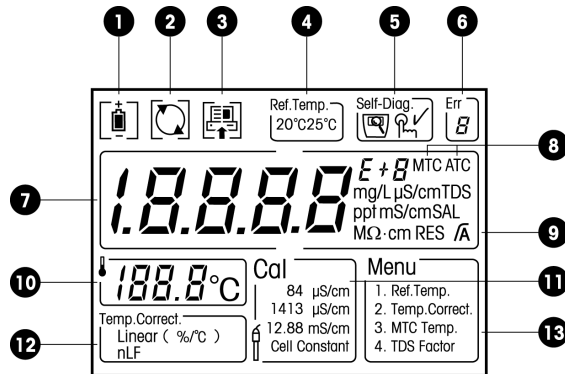
Measures for operational safety



















- Have the instrument serviced only by QIS Service!
- Always wipe off splashed liquids immediately! The instrument is not waterproof.
- Use batteries of the specified type only. Otherwise, proper operation cannot be guaranteed.
- Exclude the following environmental influences:
 - powerful vibrations,
 - direct sunlight,
 - atmospheric humidity greater than 80%,
 - corrosive gases,
 - temperatures below 5 °C and above 40 °C,
 - powerful electric or magnetic fields!

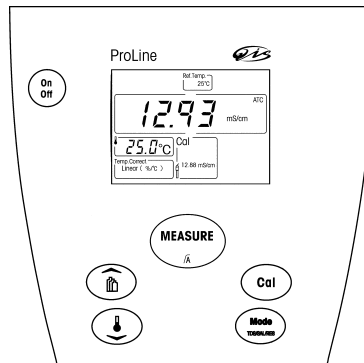
3. Description of the instrument













3.1 Display



1	Battery status						
2	Auto-off override during battery operation						
3	Data transfer to PC/printer 						
4	Reference temperature						
5	Meter self-diagnosis						
	<table border="0"> <tr> <td></td> <td>Self-diagnosis indicator</td> <td></td> <td>Indication to press key</td> <td></td> <td>Self-diagnosis passed</td> </tr> </table>		Self-diagnosis indicator		Indication to press key		Self-diagnosis passed
	Self-diagnosis indicator		Indication to press key		Self-diagnosis passed		
6	Error index						
7	Conductivity/TDS/SAL/RES reading						
8	Auto/manual temperature compensation						
9	Endpoint stability/automatic endpoint						
	<table border="0"> <tr> <td></td> <td>Endpoint stability</td> <td></td> <td>Automatic endpoint</td> </tr> </table>		Endpoint stability		Automatic endpoint		
	Endpoint stability		Automatic endpoint				
10	Temperature						
11	Calibration standards & cell constant						
12	Temperature correction method						
13	Menu setting						

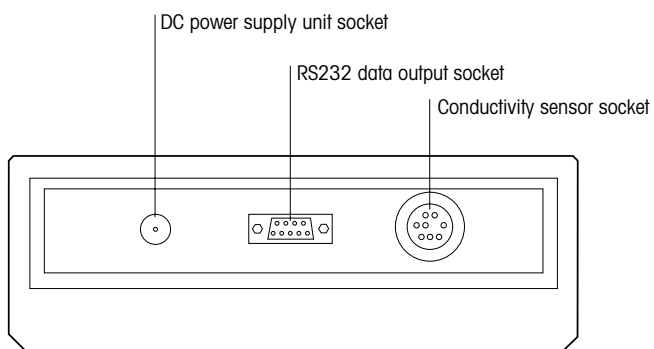
3.2 Keypad



	Press & release 	Press & hold for 2 seconds 
	Meter On/Off.	Auto-off override during battery operation. 
	<ul style="list-style-type: none"> - Start or endpoint measurement - Return to measurement mode - Confirm setting - Store entered value 	Turn autom. endpoint on/off. $\sqrt{\quad} / \sqrt{\quad}$
	Start calibration.	
	Switch between conductivity, TDS, salinity and resistivity measurement modes.	Data transfer to PC or printer. 
	Select calibration standard. Increase value during setting.	Display cell constant during measurement.
	Start menu setting. Decrease value during setting.	
	Start meter self-diagnosis. 	


4. Installation

1. Unpack the meter, power adapter, electrode, electrode arm and other accessories according to the enclosed packing list. Keep the calibration certificate in a safe place.
2. Make sure the power adapter matches your local power supply. If not, please contact your vendor.
3. Connect the conductivity sensor.
4. Connect the power supply unit to the DC socket.





5. Sample Measurement

5.1 Conductivity measurement


Place the conductivity sensor in the sample and press  to start the measurement: The decimal point flashes.

The display shows the conductivity of the sample. The automatic endpoint **A** is the meter's default setting. When the sensor output has stabilized, the display freezes automatically, and **A** appears.

The automatic endpoint algorithm is as follows: The measured conductivity of the sample may not deviate by more than 0.4% from the measured average conductivity of the probe of over 6 seconds.

By pressing and holding the  key, you can toggle between auto and manual endpoint mode. To manually endpoint a measurement, press , the display freezes, and **∞** appears.

5.2 TDS/salinity/resistivity measurement

To perform a TDS/salinity/resistivity measurement, follow the same procedure as for a conductivity measurement. Press the  key to switch between conductivity, TDS, salinity and resistivity measurement modes.

5.3 Settings


5.3.1 ATC/MTC

Most conductivity sensors have a built-in temperature probe. When a temperature probe is used, the symbol **ATC** and the sample temperature are displayed.




When the meter does not detect a temperature probe, it automatically switches to manual temperature compensation mode, and **MTC** appears.

To set the MTC temperature, see 5.3.2 Menu setting.





5.3.2 Menu setting

Press the  key, the menu's content appears on screen and the first item blinks:





Menu	
1. Ref.Temp.	Set reference temperature
2. Temp.Correct.	Set temperature correction mode
3. MTC Temp.	Set MTC temperatur
4. TDS Factor	Set TDS factor




Use the  or  key to select a menu item. When the desired item blinks, press the  key to start the setting.

Set reference temperature:





When  appears and the current reference temperature blinks, use the  or  key to toggle between 25 °C and 20 °C. Press the  key to confirm your selection.

Set temperature correction method:

When  appears and the current setting blinks, use the  or  key to toggle between linear and nLF (nonlinear factor compensation). Press the  key to confirm your selection.

If you choose the linear temperature correction method, the current temperature coefficient appears. Use the  and  keys to increase or decrease the value. Press  to confirm your setting.

Set MTC temperature:



When  appears, use the  and  keys to increase or decrease the value of the temperature for your sample. Press the  key to confirm your setting. The default setting is 25 °C.

Set TDS factor:

When the current TDS factor appears, use the  and  keys to increase or decrease the value. Press the  key to confirm your setting.

5.3.3 Data output


If a PC or printer is connected, every endpoint reading is sent to the PC or printed via the RS232 interface.




By pressing and holding the  key,  appears. The meter sends out a reading every second until it endpoints.





6. Calibration

6.1 Settings


When using the ProLine conductivity meter, you only need to do a 1-point calibration or enter a cell constant directly.


Press the  key. The current calibration setting starts to blink.


Use the  or  key to select other items either above or below. When the desired option blinks, press  to confirm your selection.

If you choose to set the cell constant, the current setting appears and the first digit blinks. Use the  and  keys to increase or decrease the value. Press the  key to confirm your setting. To finish your setting, follow the same procedure to set the next digits. Press  to confirm your setting. The default setting is 1.000.


6.2 Calibration

Place the conductivity sensor in a calibration standard and press .




The ProLine conductivity meter automatically endpoints when calibrating. To manually endpoint, press . The meter displays and freezes the standard value.

To return to sample measurement, press .


Note











- If you have entered the cell constant of your sensor and choose to use it for your measurement, you actually do not need to perform a calibration with a standard. If you press the  key under this circumstance, the instrument shows the currently entered cell constant's value instead of performing a calibration.
- To ensure the most accurate conductivity readings, you need to perform a calibration regularly.


7. Self-diagnosis

Press and hold  and  simultaneously until the meter's self-diagnosis icon  appears.


The meter displays the full screen first, then each icon will blink one after the other. The final step is to check that the keys function. This requires the user's cooperation.


When the icon  blinks, press the corresponding key within 10 seconds.



- a. When  flashes, press the  key.
- b. When  flashes, press the  key.
- c. When  flashes, press the  key.
- d. When  flashes, press the  key.
- e. When  flashes, press the  key.

When self-diagnosis is completed, a  icon appears. If self-diagnosis failed, turn to "9. Error messages" in these Operating Instructions for the proper action(s) to be taken.

8. Battery operation

The ProLine conductivity meter offers optional battery operation. Install 4 AA batteries in the rear of the meter. If the power adapter is disconnected, the meter is operated by battery and the  icon appears.

When the batteries lose power, the meter displays .

During battery operation, the meter has an auto-off function. If no key is pressed during the next 10 minutes, the meter will automatically switch off to save battery power. To override the auto-off function, press and hold the  key for 2 seconds until  appears.

9. Error messages

Error 1 - Conductivity measuring value out of range

Check if the sensor is properly connected and placed in a sample solution.

Error 2 - Temperature measuring value out of range (-5...105 °C)

Keep the sample temperature within the range.


Error 3 - The measured calibration standard temperature is out of the range (0...35 °C)

Keep the calibration standard temperature within the range.

Error 4 - In nLF temperature correction mode, temperature measuring value out of range (0...35 °C)

Keep the sample temperature within the range.

Error 5 - Self-diagnosis failed

Repeat self-diagnosis and make sure that you press the correct keys while the  icon is blinking. If Err 5 still appears, call QIS service.

10. Maintenance

10.1 Meter maintenance

There are no user-replaceable parts in the meter or power supply unit. Do not remove the covers.

The ProLine conductivity meter needs no maintenance except for an occasional wipe with a damp cloth. The housing is made of ABS/PC, which is attacked by some organic solvents, such as toluene, xylene and methyl ethyl ketone. It is good laboratory practice to wipe away any spillage immediately.

Note

To prevent static damage to the instrument, always disconnect the conductivity sensor from the meter before cleaning the sensor.

10.2 Disposal



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

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

11. Accessories

	Order no.
Power supply EU	QA8550X
Power supply UK	QA8560X
Power supply US	QA8570X
Swing arm electrode holder	QA854X
Printer	QA8060X
Printer paper, pk/5	QA8070X
Printer cable	QA8080X
Conductivity standard 1413 μ S/cm, 500ml	QS950X
Conductivity standard 12.88 mS/cm, 500ml	QS951X
Conductivity standard 111.8 mS/cm, 500ml	QS1012
Conductivity electrode 4-pole, temperature sensor, epoxy	QC2260T
Conductivity electrode 4-pole, temperature sensor, glass	QC2210T
Through flow cell	QA853X

12. Technical data

Conductivity measurement

Measurement range	Auto range
Resolution	0.00 $\mu\text{S}/\text{cm}$... 19.99 $\mu\text{S}/\text{cm}$ 20.0 $\mu\text{S}/\text{cm}$... 199.9 $\mu\text{S}/\text{cm}$ 200 $\mu\text{S}/\text{cm}$... 1999 $\mu\text{S}/\text{cm}$ 2.00 mS/cm ... 19.99 mS/cm 20.0 mS/cm ... 199.9 mS/cm 200 mS/cm ... 500 mS/cm
Limits of error	± 0.5 % of measured value
Selectable reference temperature	20 °C or 25 °C
Linear correction	Yes
Nonlinear correction (DIN38404)	Yes
Calibration standard	1-point (84 $\mu\text{S}/\text{cm}$, 1413 $\mu\text{S}/\text{cm}$, 12.88 mS/cm)

TDS measurement

Measurement range	0.0 mg/L ... 500 g/L
Resolution	Auto ranging, same as conductivity
Relative accuracy	± 0.5 %
Adjustable solids factor	0.4 ... 1.0

Salinity measurement

Measurement range (ppt)	0.00 ... 80.00
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Resistivity measurement

Measurement range	0.00 $\Omega \cdot \text{cm}$... 20 $\text{M}\Omega \cdot \text{cm}$
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Temperature measurement

Temperature range	-5.0 ... 105 °C
Temperature resolution	0.1 °C
Temperature relative accuracy	± 0.2 °C

Display	Liquid crystal
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Outputs	RS232 serial,	
	Baud rate:	1200
	Data bit:	8
	Stop bit:	1
	Parity:	none

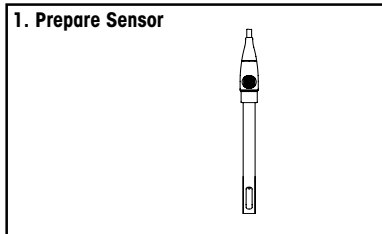
Ambient conditions	Ambient temperature:	5 ... 40 °C
	Relative humidity:	5% ... 80% (non-condensing)
	Installation category:	II
	Pollution degree:	2

Size/weight	180 x 180 x 65 mm / 0.61 kg
Materials	Housing: ABS, PC enforced Electrode stand: ABS, PC enforced Membrane keypad: Polyester
Power requirements	The ProLine conductivity meter is supplied with an appropriate power supply unit: - USA: 120 V / 60 Hz, 10 VA, 9 V DC - Europe: 230 V / 50 Hz, 10 VA, 9 V DC - UK: 240 V / 50 Hz, 10 VA, 9 V DC - Japan: 110 V / 50 Hz, 10 VA, 9 V DC - Australia: 240 V / 50 Hz, 10 VA, 9 V DC - China: 220 V / 50 Hz, 10 VA, 9 V DC - Battery (optional): 4 x AA (LR6)
Maximum relative humidity	80% for temperature up to 31 °C decreasing linearly to 50% relative humidity at 40 °C.

Note

The ProLine conductivity meter should only be operated with the power supply unit supplied, or with batteries.

13. Quick guide



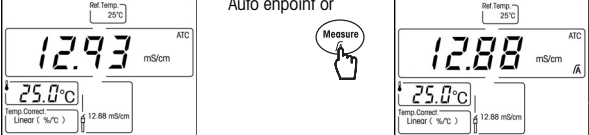
2. Calibration

Calibration standard
Stir, then leave

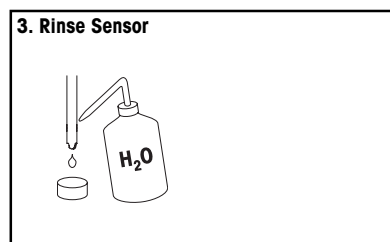
Cal

Auto endpoint or

Measure



Reading	Temperature
12.93 mS/cm	25.0°C
12.88 mS/cm	25.0°C

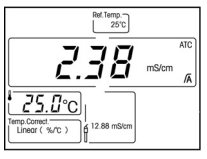


4. Measure sample

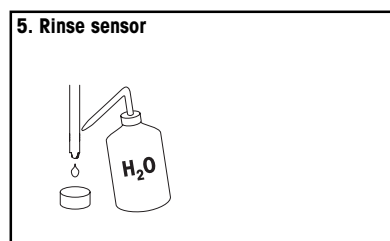
Sample
Stir, then leave

Auto endpoint or

Measure



Reading	Temperature
2.38 mS/cm	25.0°C



14. Appendix**14.1 Temperature correction factors f_{25}**

°C	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	1.918	1.912	1.906	1.899	1.893	1.887	1.881	1.875	1.869	1.863
1	1.857	1.851	1.845	1.840	1.834	1.829	1.822	1.817	1.811	1.805
2	1.800	1.794	1.788	1.783	1.777	1.772	1.766	1.761	1.756	1.750
3	1.745	1.740	1.734	1.729	1.724	1.719	1.713	1.708	1.703	1.698
4	1.693	1.688	1.683	1.678	1.673	1.668	1.663	1.658	1.653	1.648
5	1.643	1.638	1.634	1.629	1.624	1.619	1.615	1.610	1.605	1.601
6	1.596	1.591	1.587	1.582	1.578	1.573	1.569	1.564	1.560	1.555
7	1.551	1.547	1.542	1.538	1.534	1.529	1.525	1.521	1.516	1.512
8	1.508	1.504	1.500	1.496	1.491	1.487	1.483	1.479	1.475	1.471
9	1.467	1.463	1.459	1.455	1.451	1.447	1.443	1.439	1.436	1.432
10	1.428	1.424	1.420	1.416	1.413	1.409	1.405	1.401	1.398	1.384
11	1.390	1.387	1.383	1.379	1.376	1.372	1.369	1.365	1.362	1.358
12	1.354	1.351	1.347	1.344	1.341	1.337	1.334	1.330	1.327	1.323
13	1.320	1.317	1.313	1.310	1.307	1.303	1.300	1.297	1.294	1.290
14	1.287	1.284	1.281	1.278	1.274	1.271	1.268	1.265	1.262	1.259
15	1.256	1.253	1.249	1.246	1.243	1.240	1.237	1.234	1.231	1.228
16	1.225	1.222	1.219	1.216	1.214	1.211	1.208	1.205	1.202	1.199
17	1.196	1.193	1.191	1.188	1.185	1.182	1.179	1.177	1.174	1.171
18	1.168	1.166	1.163	1.160	1.157	1.155	1.152	1.149	1.147	1.144
19	1.141	1.139	1.136	1.134	1.131	1.128	1.126	1.123	1.121	1.118
20	1.116	1.113	1.111	1.108	1.105	1.103	1.101	1.098	1.096	1.093
21	1.091	1.088	1.086	1.083	1.081	1.079	1.076	1.074	1.071	1.069
22	1.067	1.064	1.062	1.060	1.057	1.055	1.053	1.051	1.048	1.046
23	1.044	1.041	1.039	1.037	1.035	1.032	1.030	1.028	1.026	1.024
24	1.021	1.019	1.017	1.015	1.013	1.011	1.008	1.006	1.004	1.002
25	1.000	0.998	0.996	0.994	0.992	0.990	0.987	0.985	0.983	0.981
26	0.979	0.977	0.975	0.973	0.971	0.969	0.967	0.965	0.963	0.961
27	0.959	0.957	0.955	0.953	0.952	0.950	0.948	0.946	0.944	0.942
28	0.940	0.938	0.936	0.934	0.933	0.931	0.929	0.927	0.925	0.923
29	0.921	0.920	0.918	0.916	0.914	0.912	0.911	0.909	0.907	0.905
30	0.903	0.902	0.900	0.898	0.896	0.895	0.893	0.891	0.889	0.888
31	0.886	0.884	0.883	0.881	0.879	0.877	0.876	0.874	0.872	0.871
32	0.869	0.867	0.866	0.864	0.863	0.861	0.859	0.858	0.856	0.854
33	0.853	0.851	0.850	0.848	0.846	0.845	0.843	0.842	0.840	0.839
34	0.837	0.835	0.834	0.832	0.831	0.829	0.828	0.826	0.825	0.823
35	0.822	0.820	0.819	0.817	0.816	0.814	0.813	0.811	0.810	0.808

14.2 Conductivity standards

t(°C)	84 µS/cm	1413 µS/cm	12.88 mS/cm
0	46 µS/cm	776 µS/cm	7.15 mS/cm
10	60 µS/cm	1020 µS/cm	9.33 mS/cm
15	68 µS/cm	1147 µS/cm	10.48 mS/cm
20	76 µS/cm	1278 µS/cm	11.67 mS/cm
25	84 µS/cm	1413 µS/cm	12.88 mS/cm
30	93 µS/cm	1552 µS/cm	14.12 mS/cm
35	102 µS/cm	1696 µS/cm	15.39 mS/cm

14.3 Practical salinity scale (UNESCO 1978)

In the conductivity meter the salinity is calculated according to the official definition of UNESCO 1978, Therefore the salinity Spsu of a sample in psu (practical salinity unit) at standard atmospheric pressure is calculated as follows:

$$S = \sum_{j=0}^5 a_j R_T^{j/2} - \frac{(T-15)}{1+k(T-15)} \sum_{j=0}^5 b_j R_T^{j/2}$$

$$\begin{aligned} a_0 &= 0.0080 & b_0 &= 0.0005 & k &= 0.00162 \\ a_1 &= -0.1692 & b_1 &= -0.0056 \\ a_2 &= 25.3851 & b_2 &= -0.0066 \\ a_3 &= 14.0941 & b_3 &= -0.0375 \\ a_4 &= -7.0261 & b_4 &= 0.0636 \\ a_5 &= 2.7081 & b_5 &= -0.0144 \end{aligned}$$

$$R_T = \frac{R_{\text{Sample}}(T)}{R_{\text{KCl}}(T)} \quad (32.4356 \text{ g KCl per } 1000 \text{ g of solution})$$

14.4 Conductivity to TDS conversion factors

Conductivity at 25 °C	TDS KCl		TDS NaCl	
	ppm value	Factor	ppm value	Factor
84 µS	40.38	0.5048	38.04	0.4755
447 µS	225.6	0.5047	215.5	0.4822
1413 µS	744.7	0.527	702.1	0.4969
1500 µS	757.1	0.5047	737.1	0.4914
8974 µS	5101	0.5685	4487	0.5000
12.880 µS	7447	0.5782	7230	0.5613
15.000 µS	8759	0.5839	8532	0.5688
80 mS	52.168	0.6521	48.384	0.6048



Quality certificate. Development, production and testing according to ISO9001.
Environmental management system according to ISO14001.



SERVICE

Worldwide service. Our extensive service network is among the best in the world and ensures maximum availability and service life of your product.



European conformity. The CE conformity mark provides you with the assurance that our products comply with the most recent EU directives.



INTERNET

On the Internet. You will quickly find lots of essential information about our products, our services, and our company at

<http://www.q-i-s.net>



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www.q-i-s.net**

Subject to technical changes and to the availability
of the accessories supplied with the instruments.
Version 2007-01