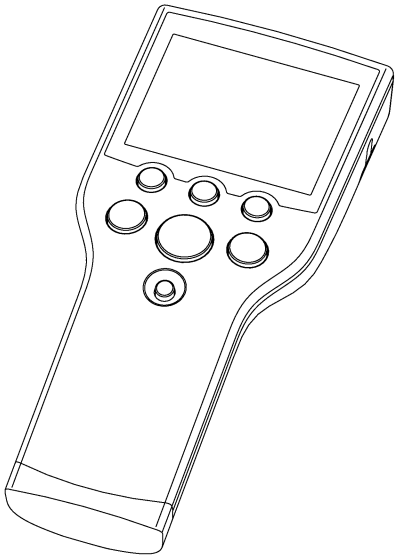
沪制 01040055 号

使用说明

Operating Instructions



SevenGo™

SG7 电导率仪 / Conductivity meter SG7

METTLER TOLEDO

目录

1. 简介

非常感谢您购买梅特勒-托利多公司的高品质便携式仪表，拥有SevenGo™系列便携式仪表，您就真正实现了移动的电化学实验室，而这正是我们一贯的追求。
SevenGo™系列便携式仪表远不仅仅是一系列高性价比的便携式仪表，同时它还具有以下诸多卓越的特点：

- 符合IP67等级，包括仪表、电极和连接器
- 易于操作，操作手册会给您提供清楚易懂的操作指南
- 卓越的人体工效学设计，使仪器与人体仿佛浑然一体
- 符合标准设备认证，确保实验测量始终精确无误
- 诸如电极夹、防护罩、新型可洗手提箱以及附加野外助手等有用附件是工厂以及野外使用的所有便携式仪表的最佳辅助设备

2. 安全措施

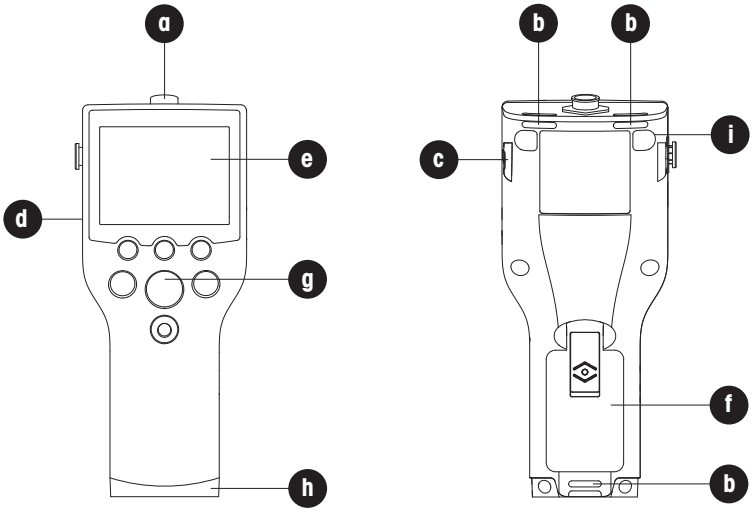
操作人员防护措施

- 切勿在有爆炸危险的环境中工作！因为仪表壳体并非气密型（可能因火花形成或者侵入气体引起的腐蚀而产生爆炸危险）。

- 使用化学品和溶剂时，请遵照供应商提供的操作指南和实验室安全规程进行操作！

操作人员操作安全预防措施

- 禁止将仪器的壳体分离。
- 仅允许梅特勒-托利多服务人员维修仪表！
- 请避免下列环境因素的影响：
  - 剧烈的震动
  - 长期处于日照下
  - 大气湿度超过85%
  - 存在腐蚀性气体
  - 环境温度低于5 °C或者超过40 °C
  - 强电场或磁场下
  - 海拔高于4000m

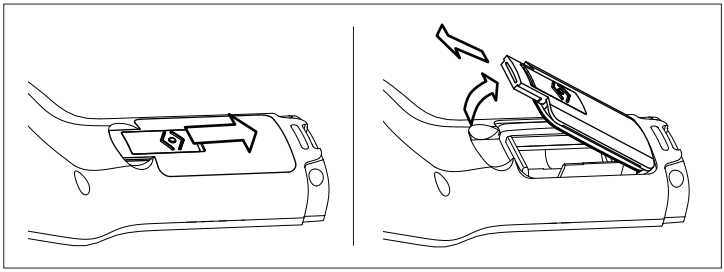


a	7针电导和温度信号输入插座
b	腕带安装槽
c	SevenGo™电极夹安装位（仪表两侧）
d	红外传输窗口
e	显示屏
f	电池盖 (51302328)
g	橡胶按键
h	蓝色端盖(51302324)及野外助手安装位
i	橡皮垫安装位

3. 安装

小心开箱取出仪表。将校准证书存放在安全位置。

3.1 电池安装/拆卸

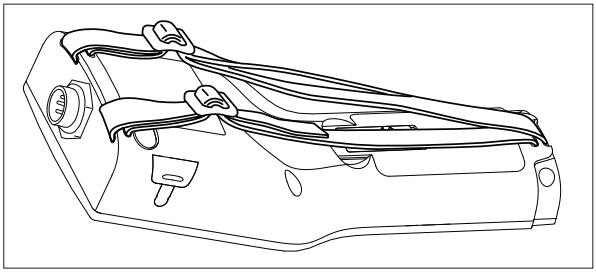


1. 向下推电池盖上的按钮, 用2个手指捏住电池盖并取下;
2. 按仪表电池盒中的标识将电池插入电池盒中; 或者用手指按住电池正极取出电池;
3. 合上电池盖, 并向上推按钮以固定电池盖。

注

IP67等级要求电池盒具有良好的密封性。当电池盖周边的O型圈破损时，请及时更换。(SevenGo™密封套件,订货号51302336)

3.2 腕带安装



根据图示安装妥当腕带。

3.3 SevenGo™电极夹（选件）

SevenGo™电极夹（51302325）是一个电极的固定装置，可以安装在仪表外壳的任意一侧。首先将电极夹固定位上的盖子去掉，可以用拇指将盖子推开，之后将电极夹按进凹陷处。可以将电极从夹子的上方插进去，并根据工作和存储的需要使电极绕夹子旋转。

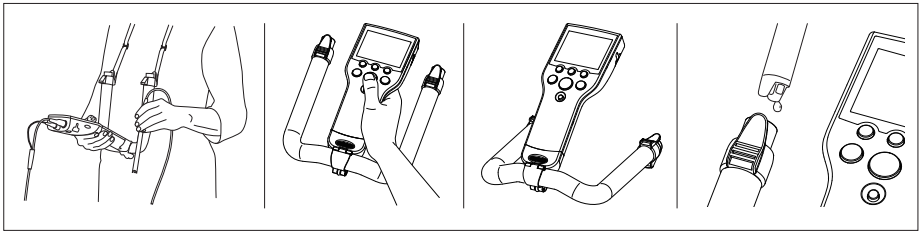
3.4 户外便携箱（选件）

户外便携箱 (51302359) 并不仅仅是一种携带测量设备的装置，它还可以用作一种理想的便携式工作站。在测量过程中可以将仪表放在便携箱中。

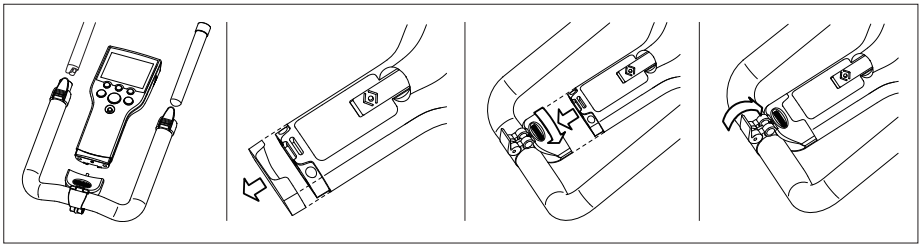
现场成套附件 (51302360)，电极夹，防护罩和腕带使操作变得十分简单。

3.5 ErGo™野外助手(选件)

ErGo™(51302320)能保护仪表免遭冲击并可安全地保护电极。对于在工厂或是野外测量，它都是一个完美的附件。若放在工作台或地上可以舒适地操作。

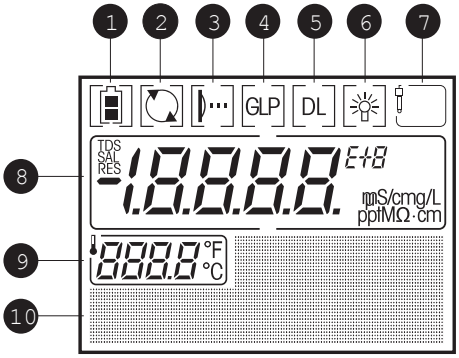


1. 卸下仪表端部上的底盖 (51302324)
2. 将ErGo™适配器拧到仪表上 (51302337)
3. 根据显示的图安装ErGo™
4. 将背带装到ErGo™的两端上。(51302321)



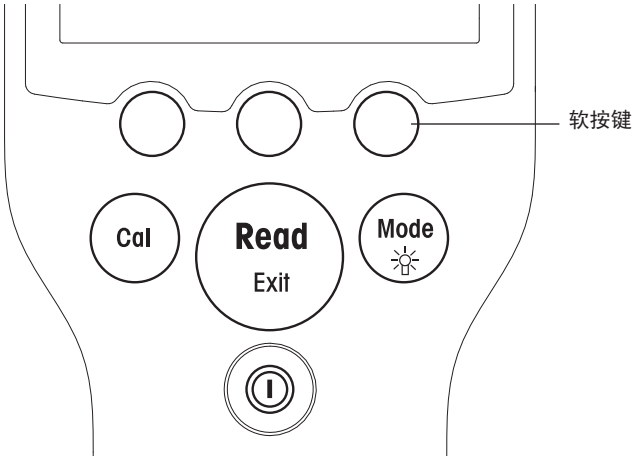
4. SG7专业电导率仪操作

4.1 显示



1	电池状态，指示电池电量是全满、半满还是空（更换电池参阅 3.1）。
2	连续测量功能被激活（禁止自动关机功能）。仪表的默认设置是十五分钟后自动关机。当再次开/关机后，自动关机功能再次被激活。
3	IrDA 红外线接口,用于与打印机或PC的数据传输(见 4.7)。
4	GLP格式（见 4.6）。
5	数据记录，定时读数激活，数据按照用户定义时间间隔传入内存。
6	背光功能开启指示灯。此时按任意键点亮背光灯。
7	校准提示: 当校准提示处于开状态时,校准时间到时,此图标闪烁。
8	电导率/总固体溶解量 /盐度/电阻率读数
9	温度
10	点矩阵区

4.2 按键控制



	按下和释放	按住持续2秒钟
	- 仪表 开/关	- 开启/关闭连续测量
Read Exit	- 启动或结束测量 - 返回测量模式 (忽略输入)	
Cal	- 开始校准	
Mode	- 电导率,TDS,盐度和电阻率模式间任意转换	- 背光:开启/关闭背光功能(背光功能开启时,如果不操作仪表则背光会在用户设定的时间后自动熄灭。按任意键可重新开启背光。时间按照用户定义在10,15或30秒间任意转换。)

4.3 软按键操作

SG7专业电导率仪具有3个软键,其功能分配视操作时的应用而不同。软键分配显示在屏幕底行上。

举例: 在某个测量状态时的屏幕上, 3个软按键的分配如下:

Menu	Store	Data
进入菜单设置	存储终点数据	进入数据菜单

其他软键功能如下：

→	向右移动一个数字	+	增加一个数值
Enter	进入突出显示的菜单 接受输入值	Exit	返回上一层目录
Select	选择突出显示的功能	↓	滚动菜单
Edit	编辑设置	Back	程序返回一步
End	存储并退出菜单	Next	程序进入一步
Save	保存校准数据	Trans	传输数据到打印机
Delete	删除所选数据	Yes	确认
	选择校准溶液		

4.4 校准

可以选择通过标准液校准仪表,或是直接输入电极的电极常数。

4.4.1 用校准溶液进行校正

- 进入“4. Set Cal.” 校准设置,选择一个校准液
  以下三种预设标准液是可供选择的:
  - 84 µS/cm
  - 1413 µS/cm
  - 12.88 mS/cm
- 将电导电极放入所选校准液中,按 **Cal** 键。(如果你选择了错误的校准溶液,可以按 键修正选择,但此功能只在专家模式下有效。)
  在信号稳定后或按 **Read** 后SevenGo™专业电导率仪 SG7根据预选终点设置来校准各终点。
- 按 **End** 软键来结束校准。读数到达终点后,校准结果显现在显示屏上。
- 要将校准数据用于随后的测量:按 **Save** 即可。
- 要放弃校准数据:按 **Cancel** 即可。

4.4.2 输入电极常数进行校正

- 进入菜单设置: “4. Set cal.”, 中的项目“5. Cell const.”
- 按 **Read** 键，回到测量模式
- 按 **Cal** 键,用软键输入电极正确的电极常数
- 按 **Ente**r 确认
- 要将输入的电极常数用于随后的测量: 按 **Save** 即可
- 要放弃输入电极常数:按 **Cancel** 即可。

注

- 为了确保最精确电导率读数,应定期用校准溶液测试电极常数,如需要请重新校准。请使用新鲜的校准溶液。
- 电导标准溶液进行校准时,只能在0 °C 到35 °C之间进行。
- 线性校准的第二点被固化在SevenGo里,就是0 S/m。因此只需一点校准。
- 对于用户定制的校准溶液来说,温度和电导率的关系无法固化在仪表中,因此当选择用户定制标准溶液时,请确保样品和校准溶液温度保持一致。

4.5 样品测量

4.5.1 电导率测量

将电导电极放在样品中并按 **Read** 以开始测量: 小数点闪动。
显示屏显示样品的电导率值。自动测量终点 A 是仪表的默认设置。
当电极输出稳定后,显示屏自动固定,并显现 A 。
自动测量终点算法的原理是:当所测样品的电导率值与6秒内所测样品的电导率平均值不超过0.4%时确定为测量终点。
请在菜单设置中选择自动、手动或是定时终点模式。要手动测量一个终点,可按 **Read**, 显示屏固定并显现 M。如果选择时间终点模式,读数时间到时,显示屏固定并显现 T.

4.5.2 总固体溶量/盐度/电阻率测量

只要按 **Mode** 即可在电导率、总固体溶量、盐度、电阻率测量之间进行切换。
对于总固体溶量测量,请在菜单2.测量设置下的子菜单4.TDS系数中设置,TDS系数范围从0.4 到1.0。
要执行总固体溶量/盐度/电阻率测量,请按与电导率测量相同的步骤执行。

4.6 电导率/TDS/盐度/电阻率测量菜单

SevenGo pro™ 专业电导率仪SG7提供四种测量模式: 电导率、TDS、盐度以及电阻率测试。
如果需要在各种测量模式之间进行转换,可以按 **Mode** 键。

菜单结构

µS/cm - mS/cm - ppt - mg/L - MΩ·cm

1.	Set temp.	(温度设置)
1.	MTC temp.	(设置手动温度补偿的温度值)
2.	Temp. unit	(设置温度单位)
1.	°C	
2.	°F	
2.	Set meas.	(测量设置)
1.	EP format	(设置测量终点方式)
1.	Auto	(选择自动终点方式)
2.	Manual	(选择手动终点方式)
3.	Timed	(选择定时终点方式)
2.	Ref. Temp.	(设置参考温度)
1.	25°C	(选择25度)
2.	20°C	(选择20度)
3.	Temp. comp.	(设置温度补偿方式)
1.	Linear	(选择线性方式)
2.	non-Linear	(选择非线性方式)
4.	TDS factor	(设置TDS系数)
3.	Sensor ID	(电极编号设置)
4.	Set Cal.	(校正设置)
1.	Standard	(设置校正标准溶液)
1.	84 µS/cm	(选择84µS/cm)
2.	1413 µS/cm	(选择1413µS/cm)
3.	12.88 mS/cm	(选择12.88mS/cm)
4.	Customized	(选择用户自定义标准溶液值)
5.	Cell const.	(选择输入电极常数)
2.	Cal. remind.	(设置校正提示)
1.	Off	(选择关闭)
2.	On	(选择开启)
5.	Data log	(数据记录设置)
1.	Auto save	(设置自动数据记录)
1.	Off	(选择关闭)
2.	On	(选择开启)
2.	T- int. read	(设置定时数据记录)
1.	Off	(选择关闭)
2.	On	(选择开启)
6.	Data output	(数据输出设置)
1.	To printer	(选择输出到打印机)
2.	To Bal. Link	(选择输出至计算机)
7.	GLP	(GLP设置)
1.	GLP	(选择GLP模式)
2.	Non-GLP	(选择非GLP模式)
8.	System	(系统设置)
1.	Time	(设置仪表时间)
2.	Date	(设置仪表日期)
3.	Light off	(设置关闭背光功能)
4.	Selftest	(执行仪表自检)

Set temp.

MTC temp. 温度设置

设定手动温度补偿
如果仪表没有连接温度探头,将自动转为手动温度补偿模式,并出现MTC。
不用温度探头工作时, 在该菜单中输入样品的温度(-5 °C至105 °C)。仪表根据此设置温度计算电极斜率并显示用该温度补偿后的测量数值。

当连接温度探头时, 无需进行温度设置。

Set meas.

EP format 终点格式

用这个菜单可以在三类终点格式间进行选择:

Auto （自动）: 自动确定终点是一种根据所用电极的特性来确定单个读数的结束的特别算法。

电导率测量的稳定性标准
自动测量终点算法的原理是:当所测样品的电导率值与6秒内所测样品的电导率平均值不超过0.4%时确定为测量终点。

“Manual”（手动）: 手动确定终点意味着如果用户不用手按 **Read** 键仪表不会结束读数。

“Timed”（定时）: 定时确定终点, 即当超过设定时间周期时自动结束读数。

注
每一种测量都可以通过按 **Read** 键进行手动终点。仪表将显示 。

以下表格显示了在测量过程中, 终点显示格式。

设定终点方式	开始测量后	信号稳定符号	终点后符号 [1]
自动终点	A	A	A
	A	Read ⟹	M
手动终点	M	Read ⇨	M
	M	Read ⟹	M
定时终点	T	⏲ ⇨	T
	T	Read ⟹	M

[1] 显示为实际终点的方式, 而不是设定的终点方式。

Ref. temp. 参比温度

参比温度可在20 °C 和25 °C间进行选择,样品的电导率值根据选定的温度读数。

Temp. comp. 温度补偿

“Linear”线性补偿

溶液的电导率随溶液温度的增加而增加。对多数溶液,在溶液的电导率和温度之间存在一个线性的关系,因此我们选择线性校正法。

输入窗口中显示温度校正系数,溶液的实测电导率值是根据下列公式进行校正的:

$G_{TRef}=G_T/(1+(\alpha\,(T-T_{Ref}))/100)$

其中:

G_T	在温度T下的实测溶液电导率值 (mS/cm)
G_{Tref}	仪器显示的溶液电导率值(mS/cm), 是根据参考温度推算回来的
α	线性温度校正系数 (%/°C)
T	测量温度 (°C)
T_{Ref}	参考温度 (20 °C or 25 °C)

注

当α系数=0时,不进行温度补偿,因此可以根据USP测量模式工作。

“Non-linear”非线性补偿

天然水的电导率值与温度的关系往往不成线性关系。基于此原因,对天然水我们采用非线性的温度补偿法。

测量的溶液电导率值乘以测量温度下的系数f_{25}就得到了参考温度25°C下的电导率值。

$G_{T25} = G_T \cdot f_{25}$

如果选择了其他参考温度, 如 20 °C可按照以下公式计算:

$G_{T20} = (G_T \cdot f_{25})/1.116$

注

天然水的测量只能在0°C 到 35.9°C之间进行,否则将出现警告“Temp. out of nLF range”。

TDS factor TDS转换因子

输入窗口出现TDS转换因子

TDS是指能够通过孔径为0.45微米过滤物的溶解固体的浓度,通常包含如下组分:碳酸盐、重碳酸盐、氯化物、硫酸盐、磷酸盐、硝酸盐、钙、镁、钠、有机离子等。TDS值的计算是用溶液的电导率值乘以TDS转换因子。

Set cal.

Predefined standards 预设标准液
可以选择一个预设的标准校准溶液(84 µS/cm, 1413 µS/cm or 12.88 mS/cm)。

“Customized” 自定义
如果你选择自己的校准标准来校准电导电极,你可以在此窗口输入所需校准标准。
校准液的最小值为: 5.00E-5 mS/cm。

“Cell const.” 电极常数
如果你知道所用电导电极的电极常数,可以在项目Set cal下选择，回到测量状态后按 **Cal** 键时,你可以自己输入电极常数。

“Sensor ID” 电极标识符
您可以设定一个8位数字电极标识符。

Calibration Reminder 校准提示
如果你选择校准提示处于“开” 状态,当设定时间(最大9999小时)到时,会提醒你进行新的校准,此时 ⁞ 闪烁.

Data log

SG7可在存储器中存储多达200组测量数据。

Auto Save (自动保存)
设置这个功能是为了自动将每一个测定的读数记录到存储器中。
如果将 “Auto save” 设置为Off,那么在测量屏幕上, 会出现Store软键。然后可以通过按这个软键来手动存储测定数据。

T-int. read (定时-间隔读数)
在定时-间隔内,在每个设定的时间周期(3…9999 秒)均将一个读数存储到存储器中。也可以按 **Read** 键停止读数。当定时-间隔读数处于“开”,DL显示在屏幕上。

对于超过15分钟的读数,请按 ⏻ 键两秒钟关闭自动关机功能。
在定时-间隔读数模式下工作时,可通过选择适当的终点模式来定义测量周期。

Data output

存储在存储器中的数据可以通过此红外线接口传输到梅特勒 - 托利多打印机或 PC软件(如LabX direct pH)。

GLP

当从存储器输出数据时有2种数据格式可供选择: GLP格式 或 非-GLP格式

举例

GLP 格式

GLP	On
Date	01-JAN-05 / JAN-01-05
Time	09:31:03
Sample_ID	000326
Result	20.7mS/cm
Temperature	25.3°C
Ref.Temp.	25°C
Temp.Comp.	2.0%/°C
ATC/MTC	ATC
Endpoint	Auto
Sensor_ID	04102601
Last_cal.	10-23-04
Signature	_____

非-GLP 格式

GLP	Off
Result	20.7mS/cm
Temperature	25.3°C
Ref.Temp.	25°C
Temp.Comp.	2.0%/°C
ATC/MTC	ATC
Endpoint	Auto

System

关闭背光

可以定义自动关闭背光的时间（10秒, 15秒, 30秒）

注

背光功能通过按和放 ☼ 按钮操作。

自检

此项菜单条目可进行例行的仪器自检。仪表首先全屏显示，然后依次闪烁每一个图标。最后一步是检测每一个按键是否功能正常。检测按键时需要用户按相应的按键。
要求用户以任意次序一个接一个按键盘上的七个功能键：按一个键后,屏幕上的对应图标即消失;继续按其余按键直到所有图标均消失。
当仪表自检成功完成后，返回系统。如果有错误报告，请联系梅特勒-托利多公司技术服务人员。

注

必须在两分钟之内按完所有七个按键，否则将显示“自检失败”，并需要重新执行该过程。

4.7 存储数据处理

4.7.1 菜单结构

按软按键Data, 以调用数据菜单:

1. Meas. Data	(输入测量数据库)
1. Review	(浏览数据)
2. Transfer	(传输数据)
1. Partial	(设置参数以传输来自存储器的部分数据)
2. All	(传输来自存储器的所有数据)
3. Delete	(删除数据)
1. Partial	(设置参数以删除来自存储器的部分数据)
2. All	(删除来自存储器的所有数据)
2. Cal. Data	(输入校准数据库)
1. Current	(浏览/传输当前校准数据)
2. 5 latest	(浏览/传输5个最后校准数据)

4.7.2 红外接口

SevenGo pro™ 可以传输所有数据或是用户自定义的数据到电脑或是梅特勒-托利多RS-P26打印机。数据传输通过仪表左侧的红外接口进行。
以下说明描述了如何进行操作:

- 从SevenGo pro™ 向RS-P26打印机传输数据是通过IR-RS232适配器进行(订购号51302333)。将RS232一端接到打印机背面相应的接口上, 把仪表的红外窗口对准红外接收装置, 开始数据传输。
- 从SevenGo pro™ 向PC传输数据可通过以下三种不同方式进行:
  - 通过计算机的IrDA interface传输到PC
  - 通过IR-RS232 适配器 (订购号51302333) 传输到PC上
  - 通过IR-USB适配器(订购号51302332) 传输到PC上

打开Hyper Terminal 或是 LabX direct pH,如下进行数据传输设置:

波特率: 9600 IR-USB / 1200 IR-RS232
数据位: 8
奇偶校验: 无
结束位: 1
信号握手: 无

将适配器连接到PC上并使仪表红外窗口对准接收装置，开始数据传输。

4.8 常规工作模式

SevenGo pro™ 仪表有两种工作模式：

专家模式	仪表的默认设置，可以使用所有功能
常规模式	所有系统和校准设置都按照专家模式下的设置固定在仪表中。

常规模式下，仅有以下功能可用：

- 校准和测量
- 编辑手动温度补偿
- 存储、查看和打印数据

激活常规模式

关闭机器。同时按 **Read**, **Mode** 和右边软按键，此时可以选择工作模式。
选择 1.常规模式。仪表自动关机。按 **On/Off** 键后开机。此时就可以不用担心修改设置和数据了，安全地工作了。

激活专家模式

关闭机器，同时按 **Read**, **Mode** 和右边软按键。
选择 2.专家模式。仪表自动关机。按 **On/Off** 键后开机，就可以使用所有功能了。

注

两种工作模式的概念是GLP的特征之一，它可以确保在常规模式下，重要的设置和数据不会被无意删除。

4.9 出错信息

Self test failed! (自检失败)	重复自检步骤并确保你在两分钟内按完七个按键。如果 “Err 1”仍然显现,请给梅特勒-托利多公司技术服务人员打电话。
Meas. out of range! (测量值超出范围)	请检查电极润湿帽是否取下，电极连接是否正确并放入待测溶液中 如果仪表未连接电极，请将短夹插入插座。
Full! (数据存储器已满)	数据存储器已满
Invalid value! (你输入的值无效)	重新输入一个值。
Temp. out of nLF range 确保样品在温度范围内。	温度超出了nLF 校准范围0...35.9°C 确保样品在温度范围内。
Temp. out of range! 使缓冲液温度保持在规定范围内。	ATC 测定温度超出电导标准液范围: 0°C ~ 35°C 使缓冲液温度保持在规定范围内。

5. 维护

5.1 仪表维护

禁止将仪器的壳体分离。
除了偶尔需要用一块湿布擦拭一下外，SevenGo™系列仪表不需要作其他维护保养。
外壳由(ABS/PC)塑料制成，会受一些有机溶剂如甲苯、二甲苯和丁酮(MEK)等的侵蚀。如出现上述情况，立即擦去溅到外壳上的此类溶剂。

注

为防止对仪器的静电干扰，在清洁探头时请将探头与仪表分开。

5.2 废弃物处理

根据欧洲报废电子电气设备（WEEE）指令(2002/96 EG)的要求,本设备不得与生活垃圾一同处理。依据各国现行法规,这也适用于非欧盟国家。
请根据当地规定将本产品送往专门适于电子电气设备的回收站处理。
如有疑问请咨询主管部门或您购买本设备的代理商。
转让本设备时(例如继续用于个人或工商业用途)请将本规定的内容一并转达。
非常感谢您对环境保护所做的贡献。

6. 选配件

	订货号
SevenGo™ 电导率仪 SG3	
SevenGo™ pH计 SG2	
SevenGo pro™ pH计 SG8	
SevenGo pro™ 溶氧仪 SG6	
InLab®738, (IP67) 电导电极	51344120
InLab®738 / 10m, (IP67) 电导电极	51344124
InLab®731, 电导电极	51344020
InLab®741, 低电导电极	51344124
LTW/Mini-DIN 适配器	51302329
ErGo™ (包括适配器和电极管)	51302320
ErGo™ 电极管	51302323
户外便携箱（空）	51302359
现场附件套件	51302360
瓶子	51300240
IR-RS232 适配器	51302333
IR-USB 适配器	51302332
RS-P26 打印机	11124313-CN
LabX direct pH	51302876
腕带	51302331
电池盖	51302328
蓝色端盖	51302324
SevenGo™ 固定夹	51302325
固定夹盖	51302327
SevenGo™ 密封套件	51302336
橡胶支脚(2个)	51302335
野外工作电极支架	51302334
ErGo™ 适配器	51302337
背带	51302321
84 µS/cm 标准溶液, 250 mL	51302153
1413 µS/cm 标准溶液（袋装）, 30 x 20 mL	51302049
1413 µS/cm 标准溶液, 250 mL	51300138
12.88 mS/cm 标准溶液（袋装）, 30 x 20 mL	51302050
12.88 mS/cm 标准溶液, 250 mL	51300139

7. 技术指标

	SevenGo pro™ 电导率仪 SG7	
计量技术参数	（0.00～19.99）µS/cm （20.0～199.9）µS/cm （200～1999）µS/cm （2.00～19.99）mS/cm （20.0～199.9）mS/cm （200～1000）mS/cm 0.5级	
测量范围	电导率	0.00 µS/cm...1000 mS/cm
	总固体溶解量	0.00 mg/L...600 g/L
	盐度	0.00...80.0 ppt
	电阻率	0.00...100.0 MΩ·cm
	温度	-5...105 °C
分辨率	电导率	自动分档
		0.00 µS/cm...19.99 µS/cm
		20.0 µS/cm...199.9 µS/cm
		200 µS/cm...1999 µS/cm
		2.00 mS/cm...19.99 mS/cm
		20.0 mS/cm...199.9 mS/cm
		200 mS/cm...1000 mS/cm
	总固体溶解量	自动分档
	盐度	0.00 ppt...19.99 ppt
		20.0 ppt...80.0 ppt
	电阻率	Ω·cm (科学计数法)
		0.00 Ω·cm...9.99 E +5 Ω·cm
		MΩ·cm
		1.00 MΩ·cm...19.99 MΩ·cm
		20.0 MΩ·cm...100.0 MΩ·cm
	温度	0.1 °C
误差极限	电导率	±0.5 % (只是对于仪表)
	总固体溶解量	±0.5 % (只是对于仪表)
	盐度	±0.5 % (只是对于仪表)
	电阻率	±0.5 % (只是对于仪表)
	温度	±0.1 °C
输出	IrDA	
电源要求	额定值	6 V DC, 70 mA
	电池	4 x AA/LR6, 1.5 V 或 NiMH, 1.2 V 可充电的
尺寸/重量	220 x 90 x 45 mm / 0.33 kg	
显示器	液晶	
信号输入	7 芯圆形连接器	
IP 等级	IP67	
电池寿命	> 500 小时（不开背光）	
环境条件	温度:	5...40 °C
	相对湿度:	5%...80% (不结露)
	安装类型:	II
	污染等级:	2
材料	壳体:	ABS/PC
	显示窗:	PMMA
	键盘:	硅橡胶

8. 附录

8.1 温度校正系数 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

8.2 电导校准溶液

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

8.3 温度补偿系数实例 (α-values)

化学物质 25°C	浓度 [%]	温度系数 α [%/°C]
HCl	10	1.56
KCl	10	1.88
CH_3COOH	10	1.69
NaCl	10	2.14
H_2SO_4	10	1.28
HF	1.5	7.20

8.4 实际盐度标准 (UNESCO 1978)

SG3 和 SG7 电导率仪测量的盐度是根据UNESCO 1978官方标准计算而得，
因此样品在压力为标准大气压得盐度Spsu是按照以下公式计算的：

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

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

$$R_T = \frac{R_{Sample}(T)}{R_{KCl}(T)}$$

(每1000g溶液中含32.4356gKCl)

8.5 电导率转换为TDS系数

电导率	TDS KCl		TDS NaCl	
25 °C	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

8.6 误差限

讯息 描述	不可接受范围	
Measured value out of range 测量值超出范围	电导率: TDS: SAL: 电阻率:	< 0.01 µS/cm 或 > 1000 mS/cm < 0.01 mg/L 或 > 600 g/L < 0.01 ppt 或 >80 ppt < 0.01 MΩ·cm 或 > 100 MΩ·cm
Temp. out of nLF range 温度超出 nLF 范围	T:	< 0 °C 或 > 35.9 °C
Temp. out of range 测量温度超出范围	T:	< 0 °C 或 > 35.0 °C

Contents

1. Introduction

Thank you for purchasing this high quality METTLER TOLEDO portable meter. Electrochemistry in motion – that is our motto. And with the SevenGo™ portable line we really mean it.
SevenGo™ is much more than just a series of portable meters with an excellent price/performance ratio. It is an ingenious concept that includes many exciting new features:

- IP67 rating: this applies to the instrument itself as well as to the sensors and the connections;
- optimum ease of use, making the operating instructions primarily a source of reference;
- excellent ergonomics, as if the instrument were part of you;
- option for regular equipment qualification, giving you full confidence that your measurement results are always accurate;
- useful accessories such as the electrode clip, the protecting cover, the new washable carry case, as well as the optional field assistant, ErGo™ – the ultimate aid for all measurements in the plant as well as in the field.

2. Safety measures

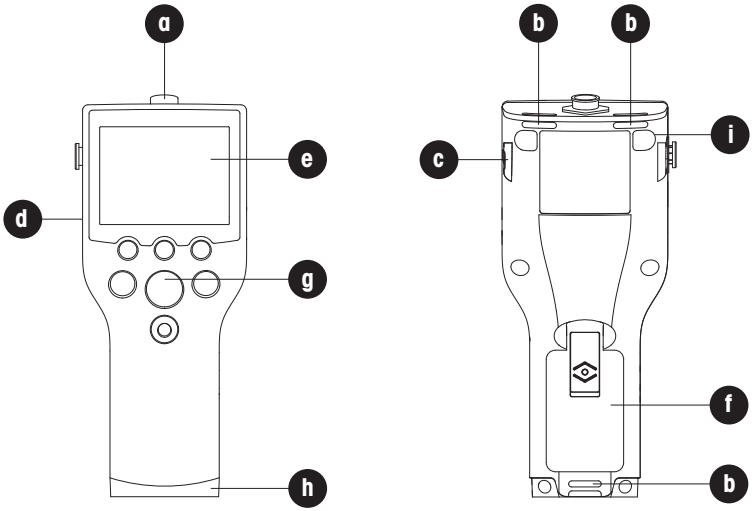
Measures for your protection

- 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 your operational safety

- Do not unscrew the two halves of the housing.
- Have the instrument serviced only by METTLER TOLEDO Service!
- Dry off any liquids sprayed immediately! The instrument is not watertight.
- Exclude the following environmental influences:
  - powerful vibrations,
  - direct sunlight,
  - atmospheric humidity greater than 80%,
  - corrosive gas atmosphere,
  - temperatures below 5 °C and above 40 °C,
  - powerful electric or magnetic fields
  - altitue above than 4000m!

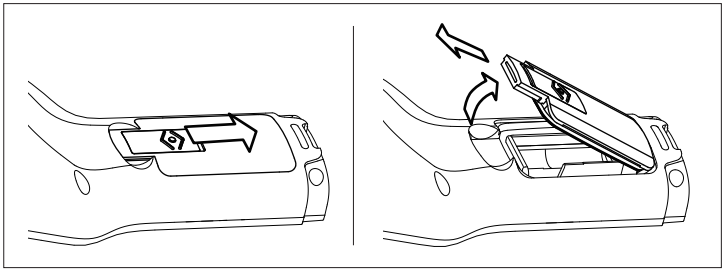


a	**7-pin LTW socket** for conductivity and temperature signal input
b	**Slots** for attaching the wrist strap
c	**Fixing points for SevenGo™ clip** (on both sides of the meter)
d	**Infrared (IrDA) window**
e	**Display**
f	**Battery cover** (51302328)
g	**Rubber key pad**
h	**Bottom cap** (51302324) blue cover over the field assistant's fixing point
i	**Rubber feet** fixing points

3. Installation

Carefully unpack the meter. Keep the calibration certificate in a safe place.

3.1 Installing the batteries

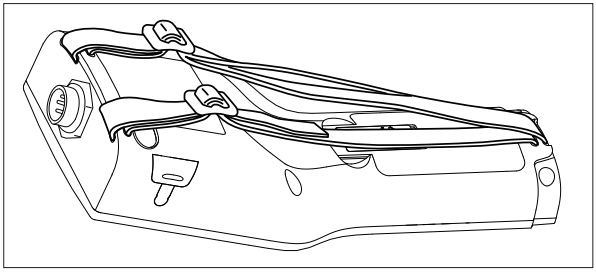


1. Push the button on the Battery cover in the direction of the arrow, hold the lid with two fingers and remove it;
2. Insert the batteries in the battery compartment, as shown; or remove the batteries in the battery compartment;
3. Replace the Battery cover, and push back the button to fix the lid in place.

Note

The IP67 rating requires the battery compartment to be perfectly sealed. The sealing ring around the Battery cover must be replaced if it is damaged in any way (SevenGo™ Sealing Kit, 51302336).

3.2 Fitting the wrist strap



Fit the wrist strap as shown in the diagram.

3.3 SevenGo™ clip (optional)

The SevenGo™ Clip (51302325) is an electrode holder that can be placed next to the display on either side of the housing. To mount the clip, remove the cover over the clip's fixing point using your thumbnail. Then attach the clip by pressing it into the recess. Slide the shaft of the sensor into the clip from top. You can switch between the storage and working positions by rotating the sensor around the clip's axis.

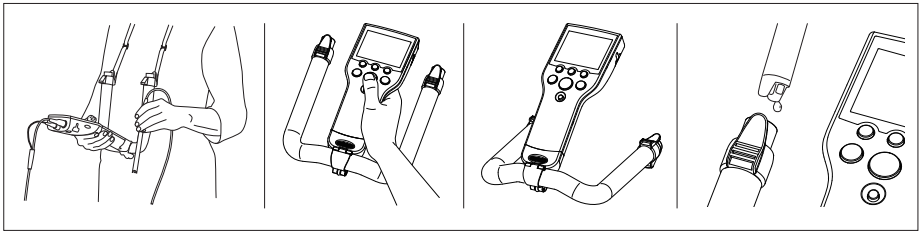
3.4 Field carry case (optional)

The portable carry case (51302359) is not just a device for transporting your measuring equipment, it is also ideal for use as a portable workbench. The meter can be placed in the carry case during the measurement.

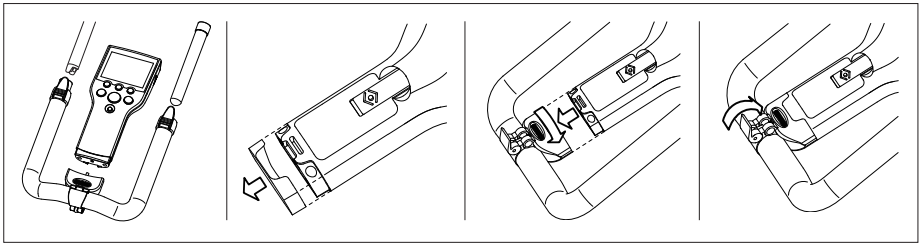
The field accessory kit (51302360) with electrode clip, protective cover and wrist strap completes your equipment. It allows you to make full use of the different possibilities offered by the system and facilitates operation.

3.5 ErGo™ field assistant (optional)

The ErGo™ (51302320) protects your instrument from shocks and allows you to safely store your electrode(s). It is the perfect accessory for carrying and measuring in the plant or field, and for working comfortably when the meter is placed on a table or on the ground.

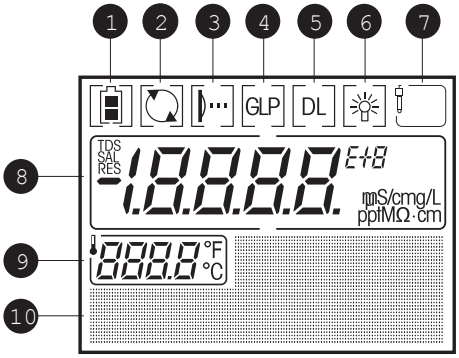


1. Remove the blue bottom cap (51302324) at the base of the meter;
2. Screw the ErGo™ adapter (51302337) onto the meter;
3. Mount the ErGo™ as shown;
4. Fit the neck strap (51302321) to both ends of the ErGo™.



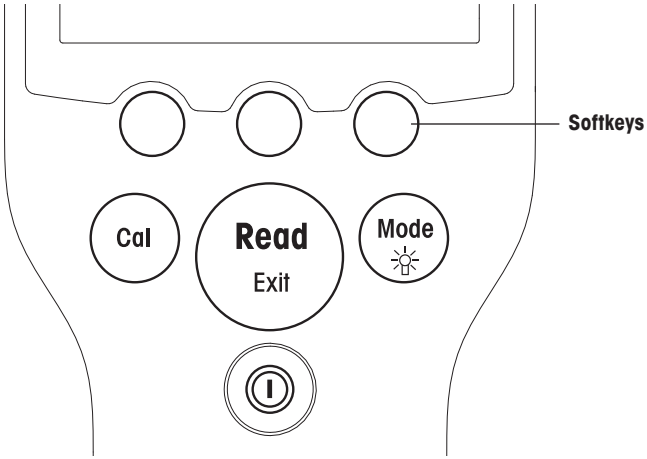
4. Operating the SG7 conductivity meter

4.1 The display



1	Battery status shows the condition of the batteries, fully charged, half-charged or fully discharged. (To replace batteries see Section 3.1)
2	Auto-off override, in default operation, the meter switches itself off after 15 minutes to prolong battery life. After switching off/on the auto-off is active again
3	IrDA infrared interface, for data transfer to printer or PC (See section 4.7)
4	GLP print-out is acitvated (See end of section 4.6)
5	Data Logging, timed interval reading is active, data is transferred to memory at a user-defined interval
6	Backlighting, meter switches on backlighting when any key is pressed
7	Calibration reminder, the frame blinks when the calibration reminder is on and a calibration is due
8	Conductivity/TDS/salinity/resistivity reading
9	Temperature
10	Dot matrix area

4.2 Key controls



	Press and release	Press and hold for 2 seconds
	- Meter on/off	- Switch on/off auto-off override (switches off the meter after 15 minutes)
Read Exit	- Start or endpoint measurement - Back to measurement mode (ignore the input)	
Cal	- Start calibration	
Mode	- Switch between conductivity, TDS, salinity and resistivity mode	- Backlighting: on/off (when backlighting is on, the meter switches on backlighting at the stroke of any key for a user defined period of 10, 15 or 30 seconds.)

4.3 Operation with softkeys

The SevenGo pro™ SG7 conductivity meter has three softkeys. The functions assigned to them change during operation depending on the application. The assignment is shown on the bottom line of the screen.

Example: In the measurement screen, the three softkeys are assigned as follows:

Menu Activate menu setting	Store Store an endpointed measurement	Data Activate "Data" menu

The other soft key functions are as follows:

→	Move one digit to the right	+	Increase value by one
Enter	Enter the highlighted menu Accept the entered value	Exit	One level up in the menu tree
Select	Select the highlighted function	↓	Scroll through the menu
Edit	Change the settings	Back	One step back in the procedure
End	Store and quit menu	Next	One step forward in the procedure
Save	Save the calibration data	Trans	Transfer data to printer or PC
Delete	Delete the selected data	Yes	Confirm deletion
	Select the calibration standard		

4.4 Calibration

You can calibrate the meter by using a standard solution, or directly enter the cell constant of your sensor.

4.4.1 Calibration using a standard solution

- Select a calibration standard in the item: "4. Set cal".
  The following three predefined standards are available:
  - 84 µS/cm
  - 1413 µS/cm
  - 12.88 mS/cm
- Place the conductivity sensor in your selected calibration standard and press **Cal**. (If you have selected the wrong standard you can alter your choice yet by pressing the softkey. This function is only available in the expert mode)
  The meter endpoints according to the pre-selected endpoint settings after the signal has stabilized or after pressing **Read**.
- End calibration by pressing **End**. After the reading has endpointed, the calibration results appear in the display.
- To use the calibration data for later measurements: Press **Save**.
- To discard the calibration data: Press **Cancel**.

4.4.2 Calibration by entering a cell constant

- Under menu setting: "4. Set cal.", select item "5. Cell const." Return to measurement screen.
- Press the **Cal** key and use the softkeys to enter the correct cell constant of your sensor.
- Press **Enter** to confirm.
- To use the entered cell constant for later measurements: Press **Save**.
- To discard the cell constant: Press **Cancel**.

Note

- To ensure the most accurate conductivity readings, you should regularly verify your cell constant with a standard solution and recalibrate if necessary. Use always fresh standards.
- Calibration with the conductivity standard programmed in the instrument can only be performed at a temperature of 0 °C to 35 °C.
- The second point required for the calibration curve is permanently programmed in the SevenGo and is 0 S/m for a specific resistivity tending toward infinity.
- Temperature dependencies cannot be programmed for the customized standard (25 °C). It is therefore important to have samples and standard solution at the same temperature, when using a customized standard.

4.5 Sample measurement

4.5.1 Performing a conductivity measurement

Place the conductivity sensor in the sample and press **Read** to start the measurement: the decimal point blinks.
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 automatically freezes, 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 in 6 seconds.
Select the automatic, manual or timed endpointing mode in the menu under "Set meas.-EP format".
To manually endpoint a measurement press **Read**, the display freezes and /M appears.
If the timed endpointing method is selected, the display freezes automatically after the set time has elapsed and /T appears.

4.5.2 Performing a TDS/salinity/resistivity measurement

Press the **Mode** key to switch between conductivity, TDS, salinity and resistivity measurement modes.
For TDS measurement you can set the TDS factor in the item "4. TDS factor" under the menu "2. Set meas."
The meter accepts a TDS factor range of 0.4 to 1.0.

To perform a TDS/salinity/resistivity measurement, follow the same procedure as for a conductivity measurement.

4.6 Menus for conductivity/TDS/salinity/resistivity measurement

SevenGo pro™ conductivity meter SG7 offers four types of measurements: conductivity, TDS, salinity and resistivity. To switch to the measurement mode required, press **Mode**.

Menu structure

µS/cm - mS/cm - ppt - mg/L - MΩ·cm

1. Set temp.
   1. MTC temp.
   2. Temp. unit
      1. °C
      2. °F
2. Set. Meas.
   1. EP format
      1. Auto
      2. Manual
      3. Timed
   2. Ref. temp.
      1. 25 °C
      2. 20 °C
   3. Temp. comp.
      1. Linear
      2. Non-linear
   4. TDS factor
3. Sensor ID
4. Set cal.
   1. Standard
      1. 84µS/cm
      2. 1413µS/cm
      3. 12.88mS/cm
      4. Customized
      5. Cell const.
   2. Cal. Remind
      1. Off
      2. On
5. Data log
   1. Auto save
      1. Off
      2. On
   2. T- int. read
      1. Off
      2. On
6. Data output
   1. To printer
   2. To PC
7. GLP
   1. GLP
   2. Non-GLP
8. System
   1. Time
   2. Date
   3. Light off
   4. Selftest

Set temp.

Set MTC temperature

When you are working without a temperature sensor, enter the temperature of the sample in this menu (-5 °C…105 °C). The meter shows the temperature-compensated value in the measurement display.

Set meas.

EP format

With this menu you can choose between one of three different types of endpoint formats:

"Auto"
Automatic endpoint is a special algorithm that determines the end of an individual reading, depending on the behavior of the sensor used.

Stability criterion for conductivity measurements

The measured conductivity of the sample may not deviate by more than 0.4% from the measured average conductivity in 6 seconds.

"Manual"
Manual endpoint means the meter never endpoints the reading unless the user manually presses **Read**.

"Timed"
With the timed endpoint, the reading is ended automatically when the set time period has elapsed.

Note

Every measurement can be endpointed manually by pressing the **Read** key. The meter then shows .

The table below shows how the entpoint format is displayed in the course of the measurement.

Preselected format	Start of measurement	Signal stability	Endpointed measurement [1])
Auto endpoint	A	A	A
	A	**Read** ⟹	M
Manual endpoint	M	**Read** ⇨	M
	M	**Read** ⟹	M
Timed endpoint	T	⇨	T
	T	**Read** ⟹	M

[1]) The actual enpoint format (last column) not the preselected is stored with the data.

Ref. temp.

You can select between the reference temperatures of 20 °C or 25 °C. The conductivity of the sample is referenced to the temperature you select during the reading.

Temp. comp.

"Linear"
The conductivity of a solution increases when the temperature increases. With most solutions, a linear interrelationship between conductivity and temperature is given. In such cases, select the linear correction method.
The input window for the temperature coefficient (0-10%/°C) appears.
The measured conductivity is corrected and displayed using the following formula:

$G_{TRef}=G_T/(1+(\alpha(T-T_{Ref}))/100)$

where

G_T	conductivity measured at temperature T (mS/cm)
G_{Tref}	conductivity (mS/cm) displayed by the meter, calculated back to the reference temperature T_{Ref}
α	linear temperature coefficient (%/°C)
T	measured temperature (°C)
T_{Ref}	reference temperature (20 °C or 25 °C)

Note

When α-coefficient = 0 no temperature correction is applied. This means you can work according to USP rules.

"Non-linear"
The conductivity of natural waters shows strong non-linear temperature behavior. For this reason, we recommend non-linear correction when measuring natural waters.
The measured conductivity is multiplied by the factor f_{25} for the measured temperature (see table in Appendix) and thus referenced to the temperature of 25 °C:

$G_{T25} = G_T \cdot f_{25}$

If another reference temperature is to be referenced, e.g. 20 °C, the conductivity referenced from 25 °C is divided by 1.116 (see f_{25} for 20.0 °C)

$G_{T20} = (G_T \cdot f_{25})/1.116$

Note

Conductivity measurements of natural waters can only be performed at temperatures ranging from 0 °C to 35.9 °C. Otherwise, the warning "Temp. out of nLF range" appears.

TDS factor

The input window for the TDS factor appears.
TDS is the concentration of dissolved solids which pass through a filter with a pore size of 0.45 microns. These are typically the following components: carbonate, bicarbonate, chloride, sulfate, phosphate, nitrate, calcium, magnesium, sodium, organic ions and other ions.
TDS (mg/L) is calculated by multiplying the conductivity value (mS/cm) by the TDS factor.

Set cal.

Predefined standards

Here you can select one of the predefined standards (84 µS/cm, 1413 µS/cm or 12.88 mS/cm)

"Customized"
If you are using your own conductivity standard for calibration of the conductivity sensor, you can enter the conductivity of the calibration standard in mS/cm in this window.
Lowest possible special standard: 5.00E-5 mS/cm. This corresponds to the conductivity of pure water at 25 °C, exclusively caused by the autoprotolysis of water.

"Cell const."
If you know the cell constant of the conductivity sensor being used, select this item in "Set cal.", when you press **Cal**, you can just enter the cell constant instead of using a standard for calibration.

"Sensor ID"
You can set an 8-digit, numerical sensor ID

Calibration Reminder

If you choose calibration reminder "On", you are requested to perform a new calibration after a certain time defined by the user (maximum 9999 h) has elapsed. In this case ⓘ blinks.

Data log

The SG7 can store up to 200 sets of measurement data in memory.

Auto Save

"Auto Save" logs automatically every endpointed reading $\overline{A}$, $\overline{M}$ and $\overline{T}$ to the memory.
If "Auto Save" is set to **Off**, the **Store** softkey appears in the measuring screen. You can then manually store endpointed data by pressing this softkey.

T-int. read (Timed-interval reading)

With timed-interval reading, a reading is stored to memory every time after a certain interval (3 – 9999 s) defined in the menu has elapsed. You may stop the reading by pressing **Read**. When timed-interval reading is "on", DL is shown on the display.

For readings lasting longer than 15 minutes, switch off the auto-off function by pressing and holding down ⏻ for two seconds.
When working in the timed-interval reading mode, you can define the length of the measurement period by selecting the appropriate endpoint mode ($\overline{A}$, $\overline{M}$ and $\overline{T}$) in the menu "2. Set. meas." under the item "1. EP format".

Data output

Data stored in the instrument's memory can be transferred to METTLER TOLEDO RS-P42 printer or PC software (e.g. BalanceLink) through the infrared interface.

GLP

There are 2 data formats for your selection when outputting the data from memory: GLP or Non-GLP:
Examples:

GLP format

GLP	On
Date	01-JAN-05 / JAN-01-05
Time	09:31:03
Sample_ID	000326
Result	20.7mS/cm
Temperature	25.3 °C
Ref.Temp.	25 °C
Temp.Comp.	2.0%/°C
ATC/MTC	ATC
Endpoint	Auto
Sensor_ID	04102601
Last_cal.	10-23-04
Signature	_____

Non-GLP format

GLP	Off
Result	20.7mS/cm
Temperature	25.3 °C
Ref.Temp.	25 °C
Temp.Comp.	2.0%/°C
ATC/MTC	ATC
Endpoint	Auto

System

"Light off"
You can define the period (10 s, 15 s, 30 s) after which the back lighting switches of automatically.

Note

The light function can be turned on/off by just pressing and holding the ☼ button.

"Self test"
This menu item starts the self diagnosis routine. The meter displays the full screen first, then each icon blinks one after the other. This way you may check whether all icons are shown regularly. The final step is to check that the keys are functioning correctly. This requires user interaction.
You are now requested to press the seven function keys on the keypad one by one in any order: after pressing a key, an icon disappears from the display; continue to press the other keys until all the icons have disappeared.

When self diagnosis has been terminated succesfully the meter returns to the system menu. If errors are reported contact METTLER TOLEDO Service.

Note

You have to finish pressing all the seven keys within two minutes, otherwise "Self test failed!" appears, and you will have to repeat the procedure.

4.7 Handling your stored data

4.7.1 Menu structure

To access the memory, press the **Data** softkey.

1. Meas. Data	(Enter measurement database)
1. Review	(Review data)
2. Transfer	(Transfer data)
1. Partial	(Set parameter to transfer part of data from memory)
2. All	(Transfer all data from memory)
3. Delete	(Delete data)
1. Partial	(Set parameter to delete part of data from memory)
2. All	(Delete all data from memory)
2. Cal. Data	(Enter calibration database)
1. Current	(Review/transfer current calibration data)
2. 5 latest	(Review/transfer 5 latest calibration data)

4.7.2 Infrared interface

With SevenGo pro™ it is possible to transfer either all data or a user defined set of data from the memory to a METTLER TOLEDO RS-P42 printer or to a PC. The data is transferred via the IR interface on the left side of the meter.
The following descrpitions describes how to proceed with the different configurations:

- Data transfer from SevenGo pro™ to an RS-P42 printer is done using an IR-RS232 adapter (51302333). To prepare for data transfer connect the RS232 plug to the corresponding interface on the backside of the printer. Point the instrument‘s IR window toward the IR receiver on the other end of the adapter cable. Start data transfer in the data menu.
- For data transfer from SevenGo pro™ to a PC, there are three different possibilities:
  - direct transfer via an IrDA interface on your PC
  - transfer via IR-RS232 adapter (51302333)
  - via IR-USB adapter (51302332)

Install the driver software (the latest drivers required to configure your PC can be downloaded from www.mt.com/pHLab).
Open Hyperterminal or BalanceLink. Adjust the settings for data transfer as follows:

Baud rate:	9600 IR-USB / 1200 IR-RS232
Data bits:	8
Parity:	none
Stop bits:	1
Handshake:	none

Connect the adapter to the PC and/or point the IR window of the meter to the IR receiver. Start the data transfer by selecting the transfer item in the data menu.

4.8 Working in the routine mode

The SevenGo pro meter has two working modes:

Expert mode	The default setting enables all functions of the meter
Routine mode	All system and calibration settings are fixed according to what was defined in the expert mode.

In the routine mode the meter only allows the following functions:

- Calibrating and measuring
- Editing the MTC temperature
- Storing, viewing and printing data

Activation of the routine mode

To change to the routine mode, switch off the meter. Press **Read**, **Mode** and the **right** softkey simultaneously. The meter now allows you to select the working mode.
Select "1. Routine" and confirm by pressing **Select**. The meter switches itself off automatically. Switch on the meter by pressing **On/Off**. From now on you can work safely without the risk of unintentionally changing settings or deleting data.

Activation of expert mode

To enable all functions, switch off the meter and press **Read**, **Mode** and the **right** softkey simultaneously.
Select "2. Expert" and confirm by pressing **Select**. The meter switches itself off automatically.
Switch on the meter by pressing **On/Off**. You now have access to all menu functions again.

Note

The concept of the two working modes is a GLP feature that ensures that important settings or stored data cannot be unintentionally changed under routine working conditions.

4.9 Error messages

Self test failed!		Repeat the self-diagnosis procedure and make sure that you finish pressing all seven keys within two minutes. If "Self test failed!" still appears, call METTLER TOLEDO Service.
Meas. out of range!	Measured value out of range	Check if the conductivity sensor is properly connected and placed in a sample solution.
Full!	Data memory is full	Go to "Data" to delete data, otherwise you will not be able to store new measurement data.
Invalid value!	The value you entered is invalid	Reenter a value.
Temp. out of nLF range	Temperature out of nLF correction range 0...35.9 °C	Keep the sample temperature within the range.
Temp. out of range!	ATC measured temperature is out of pH calibration buffer range: 0 °C ~ 35 °C	Keep the standard temperature within this range.

5. Maintenance

5.1 Meter maintenance

Never unscrew the two halves of the housing.
The SevenGo™ series instruments do not require any maintenance other than an occasional wipe with a damp cloth and the replacement of used-up batteries.
The housing is made of acrylonitrile butadiene styrene/polycarbonate (ABS/PC). This material is attacked by some organic solvents, such as toluene, xylene and methyl ethyl ketone (MEK). Any spillage should be wiped off immediately.

5.2 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.

6. Accessories

	Order No.
SevenGo™ conductivity meter SG3	
SevenGo™ pH meter SG2	
SevenGo pro™ pH meter SG8	
SevenGo pro™ dissolved oxygen meter SG6	
InLab®738, IP67 conductivity sensor	51344120
InLab®738 / 10m, IP67 conductivity sensor	51344124
IInLab®731, conductivity sensor	51344020
InLab®741, conductivity sensor	51344024
LTW/Mini-DIN adapter	51302329
ErGo™ Field assistant (incl. adapter and Ergo™ electrode tube)	51302320
ErGo™ Electrode tube	51302323
Field case accessory kit (Field electrode arm, protective cover, clip, 4 bottles)	51302360
Plastic sample bottle	51300240
IR-RS232 adapter	51302333
IR-USB adapter	51302332
RS-P26 printer	11124313-CN
LabX direct pH	51302876
Wrist strap	51302331
Battery cover	51302328
Bottom cap blue	51302324
SevenGo™ clip	51302325
Clip cover	51302327
SevenGo™ sealing kit (sealing rings for battery case and electrode plugs)	51302336
Rubber feet (2 pcs.)	51302335
Field electrode arm	51302334
ErGo™ adapter	51302337
Neck strap	51302321
84 µS/cm standard solution, 250 mL	51302153
1413 µS/cm standard solution sachets, 30 x 20 mL	51302049
1413 µS/cm standard solution, 250 mL	51300138
12.88 mS/cm standard solution sachets, 30 x 20 mL	51302050
12.88 mS/cm standard solution, 250 mL	51300139

7. Specifications

	SevenGo pro™ conductivity meter SG7	
Measurement range	Conductivity	0.00 µS/cm…1000 mS/cm
	TDS	0.00 mg/L…600 g/L
	Salinity	0.00…80.0 ppt
	Resistivity	0.00…100.0 MΩ·cm
	Temperature	-5…105 °C
Resolution	Conductivity	Auto range
		0.00 µS/cm…19.99 µS/cm
		20.0 µS/cm…199.9 µS/cm
		200 µS/cm…1999 µS/cm
		2.00 mS/cm…19.99 mS/cm
		20.0 mS/cm…199.9 mS/cm
		200 mS/cm…1000 mS/cm
	TDS	Auto range, same as conductivity
	Salinity	0.00 ppt…19.99 ppt
		20.0 ppt…80.0 ppt
	Resistivity	Ω·cm (Scientific)
		0.00 Ω·cm…9.99 E +5 Ω·cm
		MΩ·cm
		1.00 MΩ·cm…19.99 MΩ·cm
		20.0 MΩ·cm…100.0 MΩ·cm
	Temperature	0.1 °C
Limits of error	Conductivity	±0.5 % of measured value
	TDS	±0.5 % of measured value
	Salinity	±0.5 % of measured value
	Resistivity	±0.5 % of measured value
	Temperature	±0.1 °C
Output	IrDA	
Power requirements	Ratings: Batteries:	6 V DC, 70 mA 4 x AA/LR6 1.5 V or NiMH 1.2 V rechargeable
Size/Weight	220 x 90x 45 mm / 0.33 kg	
Display	Liquid crystal	
Signal input	7-Pin LTW plug	
IP rating	IP67 with and without electrode	
Battery life	> 500 working hours (with no backlighting)	
Ambient conditions	Temperature:	5…40 °C
	Relative humidity:	5%...80% (non-condensing)
	Installation category:	II
	Pollution degree:	2
Materials	Housing:	ABS/PC reenforced
	Window:	polymethylmethacrylate (PMMA)
	Keypad:	silicone rubber

8. Appendix

8.1 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

8.2 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

8.3 Examples of temperature coefficients (α-values)

Substance at 25 °C	**Concentration** [%]	**Temperature coefficient** α [%/°C]
HCl	10	1.56
KCl	10	1.88
CH_3COOH	10	1.69
NaCl	10	2.14
H_2SO_4	10	1.28
HF	1.5	7.20

8.4 Practical salinity scale (UNESCO 1978)

In the SG3 and SG7 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:

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

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

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

8.5 Conductivity to TDS conversion factors

Conductivity	TDS KCl		TDS NaCl	
at 25 °C	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

8.6 Error limits

Message description	Range not accepted	
Measured value out of range	C:	< 0.01 µS/cm or > 1000 mS/cm
	TDS:	< 0.01 mg/L or > 600 g/L
	SAL:	< 0.01 ppt or >80 ppt
	Res:	< 0.01 MΩ·cm or > 100 MΩ·cm
Temp. out of nLF range	T:	< 0 °C or > 35.9 °C
Temp. out of range	T:	< 0 °C or > 35.0 °C

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