



操作手册

C 8825.4 - C 8325.5 - C 8520.5

环形电导率 - TDS 探头

4-20 mA – RS485 – Modbus RTU

电导率范围

20.00 - 200.0 - 2000 mS
4.000 - 40.00 - 400.0 mS

TDS范围

10.00 - 100.0 - 1000 ppt
2.000 - 20.00 - 200.0 ppt

可选

S/N
REP N°

供电电源: 9 ~ 36 Vdc

内置版本: R 3.1x



C 8825.4



C 8325.5



C 8520.5

INDEX

1 - GENERAL WARNINGS AND INFORMATION FOR ALL USERS	3
1.1 Warranty	3
1.2 After sales service	3
1.3 CE marking.....	3
1.4 Safety warnings	3
1.5 Special warnings	4
1.6 Manual revisions	4
2 - PRODUCT OVERVIEW	5
2.1 Functional purpose of the device	5
2.2 Accessories	6
3 - INSTRUCTION MANUAL CONTENTS	7
3.1 Symbols	7
3.2 How to read the instruction manual	7
4 - SPECIFICATIONS AND TECHNICAL DATA	8
4.1 Functional specification	8
4.2 Technical data	10
4.2.1 General specifications.....	10
4.2.2 Technical specifications.....	11
5 - INSTALLATION	14
5.1 Packing list	14
5.2 Unpacking and repacking of the unit	14
5.3 Storage and transport.....	14
5.4 Installation of C 8825.4.....	14
5.5 Installation of C 8325.5	14
5.6 Installation of C 8520.5	15
5.7 Electrical installation	15
5.7.1 Connection in analog mode to B&C instruments.....	16
5.7.2 Network connection (RS485)	16
5.7.3 Connection in digital mode to B&C instruments.....	17
5.8 Disposal	18
6 - OPERATING PROCEDURE	19
6.1 Measuring principle.....	19
6.2 Operating mode.....	19
6.3 Analog mode.....	19

6.4	Digital mode	20
6.4.1	B&C communication protocol.....	20
6.4.2	Modbus protocol	36
7 - MAINTENANCE		45
<hr/>		
7.1	Calibration	45
8 - INSTALLATION DRAWINGS		46
<hr/>		
8.1	C 8825.4 - Dimensions.....	46
8.2	C 8325.5 - Dimensions.....	47
8.3	C 8520.5 - Dimensions.....	48
8.4	C 8325.5 - C 8520.5 - Installation.....	49
8.5	Analog mode wiring.....	50
8.6	Digital mode wiring.....	51
9 - WARRANTY		52
<hr/>		
10 - REPAIRS		52
<hr/>		

1 对所有用户的一般警告和信息

1.1 质保

本产品对所有制造环节产生的故障缺陷提供质量保证。

请查看本手册最后的保修证书中所描述的条款和条件。

1.2 售后服务

B&C Electronics向所有客户提供以下服务：

- 我们通过电话（和中国区域支持微信视频）免费提供技术援助，解决安装、校准和定期维护方面的问题；
- 在我们的工厂总部--Carnate (意大利)--可以提供各种损坏的维修服务，以及校准或定期维护服务。

请查看本手册末尾的技术支持数据表，以获得更多详细信息。

1.3 CE 标记

本仪器遵循下列欧洲共同体标准制造：

- 2011/65/EU " Restriction of the use of certain hazardous substances in electrical and electronic equipment/限制在电气和电子设备中使用某些危险物质"
- 2014/30/EU "Electromagnetic compatibility/电磁适应性"
- EN 61326-1/2013 "Electromagnetic compatibility /电磁适应性"
 - Industrial use/工业用途
- EN 55011/2009 "Radio-f requency disturbance characteristics/射频干扰特性"
 - Class A (devices for usage in all establishment other than domestic)
 - Group 1 (Industrial equipment that do not exceed 9kHz)

在包装上和仪器的S/N标签上都有标记  。

1.4 安全警示

必须强调的是，电子仪器较容易发生故障。

因此，必须采取一切必要的预防措施，以避免因故障而造成的损害，对变送器的任何操作必须由经授权和受过培训的工作人员来执行。

为了避免潜在的损坏或是减少本变送器的使用寿命，本变送器的使用必须符合“仪器规格(第8页)”一章中所述的参数。

1.5 特别警告

为保证可靠运行，防止不可逆转的损害：

- 避免拧开或松开电缆压盖；
- 在浸入式使用过程中，使用适配器和适当长度的加长管保护电缆。

1.6 手册版本

本章简要描述了以前发布的同一手册版本之间的差异，可以更好地帮助已经熟悉本产品的用户。

Rev. A 版本

2 产品概览

2.1 设备的功能用途

该探头设计用于根据感应法测量电导率和 TDS（溶解性总固体）。

应用领域

主要应用包括测量非常脏和腐蚀性液体中的电导率和 TDS，如工业污水、浓酸、盐水、盐溶液和结壳溶液、海水。

选型

C 8825.4 用于浸入式安装或管路安装, PVC材质.

C 8325.5 用于浸入式安装或流通式安装, PVDF 材质.

C 8520.5 用于流通式安装, PVDF 材质.

探头的构成

测量系统包括:

- 两个环形线圈;
- 温度传感器;
- 内置 两线制 4-20 mA 变送器;
- RS 485 输出带MODBUS RTU/B&C协议用于数据远传, 校准和参数设置。

探头可在模拟或数字模式下工作 (参见 "操作步骤 (第 19 页) "一章) 。

该探头可作为从属设备连接到 MC 6587 和 MC 7687 仪器上, 这些仪器的功能是作为主控仪表使用。

2.2 附件

传感器和配件可用于不同的应用，需要单独订购。

我们的员工随时可以帮助客户选择最合适的解决方案，以满足他们的特定需求。

配件



BC 8701

RS485/USB 转换器带 Vdc 输出

C 8825.4的配件



SZ 7531

1 "GAS 螺纹 管接头

C 8325.5的配件



YBP75M0011 流通式安装接头



SZ 724

用于安装在DN 40 卫生接头锥面上的螺母配件

3 操作手册导览

本章节介绍手册并向所有用户提供如何阅读和使用它的建议；

本手册是按照下列规范编写的：

- UNI 10893 "Instructions for use/使用说明"；
 - UNI 10653 "Quality of product technical documentation/产品技术文件质量"。
- 遵循国际计量词汇表(VIM)中所示的术语。

3.1 标记说明

在整个手册中，您都可以见到以下符号，它们都是一种规范写法，或仅是惯例。



警告：此符号用于警告用户，如果忽略或未正确遵循指令，仪器可能受到损坏。



注意：此符号旨在提醒用户特别注意手册中的某一特定部分

3.2 如何阅读本操作手册

本手册包含了产品所需的全部信息，能确保用户进行合适的安装、正确的使用和维护，以便在操作的时候达到预期的效果。

本手册的使用对象是在测量和控制领域具有相关知识，和有在工业环境下使用传感器和变送器经验的工作人员。

这本手册的目录部分能让读者快速查询那些想要了解和学习方面的章节；

特别是，前几个章节会显示一般性的介绍，并允许用户熟悉该产品，包括它的功能用途和必要的附件或使用的选择。

然后，用户可以检查自己是否熟悉使用该仪器和测量/控制所需的所有要素；

4 规格

4.1 功能介绍

输入

该探头可进行电导率、TDS和温度的测量。

规模

该仪器允许选择以下量程：

20.00 / 200.0 / 2000 mS;

4.000 / 40.00 / 400.0 mS;

10.00 / 100.0 / 1000 ppt;

2.000 / 20.00 / 200.0 ppt。

而且，用户可以通过设置任意的系数，在模拟输出上获得不同的满量程值。

温度

探头通过发送数字输出上检测到的值来进行温度测量。

内部通过应用设定的TC系数进行温度补偿。参考温度可在20°C或25°C之间选择。

在电导率校准时，用户可以选择使用的标准氯化钾溶液的TC值。

模拟输出

探头工作在两线制电流4-20mA，与主测量值成正比。

输出电流可以根据探头配置中的电导率或TDS值进行处理。

模拟输出是电隔离的，因此可以直接连接到PLC、数据采集卡或B&Celectronics 仪器，输入4-20 mA。

串行接口

通过隔离的RS485接口，用户可以使用简单的终端仿真程序将探头连接到终端或PC上。RS485/RS232或RS485/USB转换器是必要的。

在使用B&C协议时，可以接收测量，参数设置和校准管理。

与Modbus协议一起使用时，实现了函数03、06和16，用于读取测量值、更改操作参数和校准。

B&C Electronics的MC 6587和MC 7687控制器允许对探头进行全功能的控制。

电导率测量，TDS和温度始终传输。引导加载程序功能允许用户更新版本。

过滤软件

输入信号具有两个可选响应时间的滤波器。

用户可以单独设置相对于小或大变化信号的响应时间，以获得良好的读数稳定性和对测量过程中变化的快速响应。

在数字模式下，只有当查询之间的时间间隔明显低于设置的滤波时间时，软件滤波器才会起作用。

供电

仪器供电（最小9 Vdc ~ 最大36 Vdc）通过两线制电流回路，直接从PLC或数据采集板上提供电源，或由电源串联在模拟输出和采集设备之间。

当在数字模式下工作时，仪器使用电流回路的端子供电。

探头的配置和校准

探头的配置和校准是通过串行接口（见章节“数字模式（第20页）”）或使用MC 6587或MC 7685控制器进行的。

4.2 技术数据

4.2.1 通用规范

常见的规格

相对湿度	最大95% 无凝结
储存温度	-5°C~ +50°C
保护	IP68
免疫性能损失	< 1%满量程

C 8825.4 规范

工作温度	-5°C~ +50°C
工作压力	25°C时最大10bar / 50°C时最大5bar
身体	PVC
直径/长度	60mm / 165mm
螺纹	1- 1/2" NPT
电缆	5 x 0.25 mmq, L= 10 m, 护套PVC
重量	探头270 g, 电缆640 g

C 8325.5 规格

工作温度	-5°C~ +60°C
工作压力	25°C时最大10bar / 50°C时最大5bar
身体	PVDF
直径/长度	40mm / 264 mm
螺纹	配套SZ724/锥形DN40
电缆	5 x 0.25 mmq, L= 10 m, 护套PVC
重量	探头310 g, 电缆640 g

C 8520.5 规格

工作温度	-5°C~ +60°C
工作压力	25°C时最大10bar / 50°C时最大5bar
身体	PVDF
直径/长度	50mm / 250mm
螺纹	锥形DN32
连接器	7针
重量	探头310 g

4.2.2 技术规格

主要测量				默认值
传感器类型				环形
测量				电导率
测量方法				电感式
电导率量程				200.0 mS
				20.00 / 200.0 / 2000 mS 4.000 / 40.00 / 400.0 mS
量程	分辨率	下限值	上限值	
0.00 ~ 20.00 mS	0.01 mS	-2.00	22.00	
0.0 ~ 200.0 mS	0.1 mS	-20.0	220.0	
0 ~ 2000 mS	1 mS	-200	2200	
0.000 ~ 4.000 mS	0.001 mS	-0.400	4.400	
0.00 ~ 40.00 mS	0.01 mS	-4.00	44.00	
0.0 ~ 400.0 mS	0.1 mS	-40.0	440.0	
测量更新				2秒
过滤软件				
90%的小信号时响应时间		2 ~ 220秒		10s
90%大信号时的响应时间		2~ 220秒		2 s
零点				0%
				±10%满量程 所有量程自动校准
灵敏度				100%
校正时TC				TC设置
				TC设置/ TC KCl TC KCl (瞬时) 用于灵敏度校准。从校准或探头重新通电后20秒自动复位到TC设置。
灵敏度校准溶液				102.1 mS
TDS换算表				从
TDS/ EC 转换系数				0.670
量程		电导率	TDS量程	

1	20.00 mS	10.00 ppt	
2	200.0 mS	100.0 ppt	
3	2000 mS	1000 ppt	
4	4.000 mS	2.000 ppt	

主要测量			默认值
5	40.00 mS	20.00 ppt	
6	400.0 mS	200.0 ppt	

温度		默认值
热补偿传感器	RTD Pt100 (内置)	
补偿范围	0.0 ~ 100.0°C (TC=3.5%, Tref=25°C) -20.0 ~ 100.0°C (TC=2.2%, Tref=25°C)	
零点	±5.0°C	0.0°C
参考温度	20°C/ 25°C	20°C
温度系数	0.00 ~ 3.50% /°C	2.00% /°C

两线制电流 (数字模式= 0)			默认值
两线制4-20mA电流对应-测量比例			
输出比例系数	10 ~ 100%		100%
范围内/范围外	3.80 mA / 20.80 mA		
打开时所选量程的ID			
(如果TDS =ON)			
1- 20.00 mS量程	11mA, 16秒	11,5 mA , 16 s内	
2- 200.0 mS量程	12 mA, 16秒	12,5 mA , 16 s内	
3- 2000 mS量程	13 mA, 16秒	13,5 mA , 16 s内	
4- 4.000 mS量程	14 mA, 16秒	14,5 mA , 16 s内	
5- 40.00 mS量程	15 mA, 16秒	15.5 mA , 16 s内	
6- 400.0 mS量程	16 mA, 16秒	16,5 mA , 16 s内	

数字功能	默认值

协议	B&C协议ASCII Modbus RTU 两种协议可以共存	
B&C标识协议	ID = 01 ~ 99 *最后s/n位数字, 如果0 ID=10	01 ~ 10 *
Modbus地址	ID = 01 ~ 243 *最后s/n位数字, 如果0 ID=10	01 ~ 10 *
在询问下提供测量和参数 (参见协议B&C ASCII和 Modbus RTU function03 - 06 -16)		

串行接口		默认值
接口	RS 485未终止	
	从样品中分离	
	不与回路/电源隔离	
波特率	2400 / 4800 / 9600 / 19200波特	9600波特
距离	1000 / 500 / 250 / 125m	
探头组网	最多32个探头	

供电		默认值
电源	9~36 Vdc	
吸收		
• 数字模式= 0	典型4-20 mA, 最大22 mA	
• 数字模式= 1	根据量程显示 11 ~ 16 mA	
• 数字模式= 2	8.5 mA	
	传输时的吸收可能更高	

5 安装

5.1 装箱单

仪器包装 包含：

- 1个环形EC探头；
- 1份使用说明书。

5.2 拆箱和重新包装

- 1 打开纸箱，保存好。
- 2 取下包裹在透明塑料护套中的探头。
- 3 取下塑料盖。



小心处理探头。如果重新包装，逆向操作。

5.3 储存及运输

如需长期储存，请将本品置于干燥处。

如需运输，请将产品包装在纸箱内。

5.4 C 8825.4 的安装

当在浸入式安装时，探头必须至少浸入到测量孔（约8厘米）的位置，并放置在距离底部几厘米的位置。

延伸沉入杆管不包括在供货清单中，用1-1/2" NPT螺纹固定在顶部，在深度潜水时保护电缆；也可以使用SZ 7531 附件，它允许使用1" GAS 螺纹管。

使用管道时，使用1 1/2" FNPT螺纹配件，注意保持管壁和探头下部之间几厘米的距离。

建议将探头水平安装在管道弯头中。

请勿垂直向上安装探头，以免在探头的测量区域有沉积物。

5.5 C 8325.5 的安装

在浸入式安装时，探头必须至少浸入到测量孔（约8厘米）的位置，并放置在距离底部几厘米的位置。

延伸沉入杆管不包括在供货清单中，固定在上部，在沉入安装时保护电缆。

当在插入式安装使用时，使用附件SZ 724可用于安装在DN40锥形接头上，注意在管壁和探头下部之间保持几厘米的距离。

建议将探头水平安装在管道弯头上。

探头也可以使用附件YBP75M0011安装在流动中（更多信息请联系我们的销售部）。

不要垂直向上安装探头，以免在探头的测量区域有沉积物。

5.6 C8520.5 的安装

探头设计用于安装在DN32锥形卫生接头上，注意在管壁和探头下部之间保持几厘米的距离。建议将探头水平安装在管道弯头内。

请勿垂直向上安装探头，以免在探头的测量区域有沉积物。


5.7 电气安装

根据电缆导线的颜色将探头连接到仪表上。

通过电流回路的正常操作模式使用防止反向连接的白色和绿色导线。

电缆的屏蔽层不连接在探头内部，但必须连接到系统接地。

线颜色	函数
屏蔽	没有连接
黄色	RS485 A (+)
灰色	RS485 B (-)
棕色	没有连接
绿色	+两线制电流
白色	-两线制电流/ COM RS485

 请勿在RS485接口（低黄、灰色）线上接电源，以免断线。

避免断线。如有需要，请使用高绝缘接线盒和延长线p/n 2423405

(5x0.25 - D 5.70 mm) 。电缆应远离电源电缆以及电气面板内的电源线。

5.7.1 以模拟模式连接到B&C公司的仪表

在模拟模式下，可以将电导率探头连接到意大利B&Celectronics公司的仪器BC 7335 - BC 7635 - BC 7687 - BC 6587，以便通过其特性简化其使用：

- 配置对应4-20 mA输入信号的量程；
- 调零和灵敏度；
- 两个独立设定点；
- 报警继电器min / max；
- 隔离输出0-20 mA或4-20 mA；
- 数字输入，以保持仪器在校准期间保持或在自清洁周期。

将传感器连接到控制器，如下所示：

线缆颜色	BC 7335	BC 7635	BC 7687	BC 6587
绿色	20	20	20	25
白色	22	22	22	23

校准

当探头以模拟模式连接到上述仪器时，可以使用仪器中提供的零点和灵敏度调整以及具体的使用说明书中描述的方法，对电导率或TDS测量的校准进行小的修正。

通过这样做，您可以避免通过数字连接对探头进行校准，这种校准仅在安装时进行，以改变刻度或使用刻度因子来实现模拟输出的中间和更充分的刻度。

5.7.2 网络连接 (RS485)

这些数字探头使用RS485驱动器与慢速切换前。

这意味着即使长距离也不需要完成传输线的终止。

下面的说明可以作为例子来考虑。

如果主设备的驱动器有非常快的切换前，可能有必要终止传输线的开始和结束。在这种情况下，应在传输线中插入一个上拉和下拉Rp电阻，以保持线路的平稳化，并保证起动条件（起动位）。

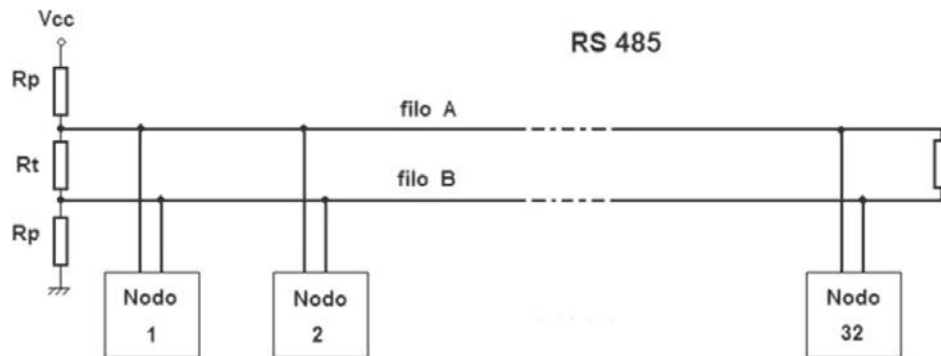


图1上拉和下拉电阻端接

如果没有电源来插入线路上的上拉和下拉电阻，或者为了不使驱动器过载而增加传感器和设备的消耗，则通过插入与终端电阻器串联的电容器来进行AC终止。

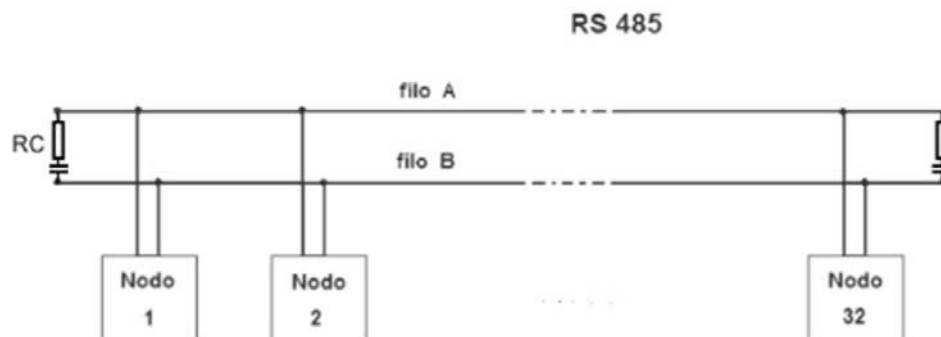


图2AC终端

所使用的电容器取决于电缆的长度，并作为指示，它们如下：

10 nF (150m) - 22 nF (300m) - 47 nF (600m) - 100 nF (1200m)

5.7.3 以数字方式连接到B&C公司的仪器

在数字模式下，可以将浊度探头连接到意大利B&Celectronics公司的MC7687和MC6587仪器。有关可用功能，请参阅仪器的特定手册。将传感器连接到控制器上的方法如下：

电线的颜色	MC 7687端子	MC 6587终端
绿色	40	35
白色	37	32
黄色的	39	34
灰色	38	33

5.8 处理

对该仪表的任何处置，请遵循当地有关处置电子设备的法律条款。

6 操作程序

6.1 测量原理

电感式电导率传感器由两个并排的环形磁芯组成，嵌入塑料材料中，因此不与样品接触。通孔可以让样品在其周围形成一个假想的电磁回路。

在发射极环面施加交流电，同时在接收器上检测到与样品电导率成正比的电流。

TDS值通过应用可设定转换系数从电导率值计算出来。

6.2 操作模式

探头可设置成模拟或数字工作模式。

要在模拟模式下工作，必须设置“数字模式 digital mode= 0”。

对于数字模式操作，必须配置“数字模式 digital mode= 1或2”。

要更改操作模式，请设置新参数，断电探头并再次通电。

6.3 模拟模式

在模拟工作模式下，探头提供与样品隔离的4-20 mA两线制输出电流，用于直接连接到PLC或数据记录仪。


模拟模式下的探头可以连接到BC 7335 - BC 7635 - BC 7687 - BC 6587 等B&C电子仪器，显示测量值，并提供有两个设定点开/关和报警继电器。

该探头提供模拟模式（数字模式= 0）的工厂配置。

探头从接通到稳定内部电路的运行需要2秒。

2秒后，电流回路在接下来的16秒内稳定下来，通过测量期间显示的预置的电流值，使操作人员能够识别配置中选择的测量量程范围：

- 11 mA表示量程0.00 ~ 20.00 mS;
- 12 mA表示量程0.0 ~ 200.0 mS;
- 13 mA表示量程0 ~ 2000 mS;
- 14 mA表示尺度为0.000 ~ 4.000 mS;
- 15 mA表示量程0.00 ~ 40.00 mS;
- 16 mA表示量程0.0 ~ 4000.0 mS.

 如果在开关接通后 2 至 18 秒的时间间隔内没有检测到任何 RS485 串行接口活动，探头将明确进入 4-20 mA 电流环路模拟模式。忽略串行接口上的任何后续活动。

如果在此期间检测到RS485串行接口活动，则探头将进入数字模式（典型吸收8.5 mA，可能在传输期间更高），直到下一次重启。

6.4 数字模式

在数字模式下，探头是通过RS485串行接口与主设备交互的从设备。

在连接到PC的情况下，可能需要RS485/RS232或RS485/USB（如BC 8701）转换器。

通信是通过RS485连接的B&C协议（ASCII）和Modbus RTU（function03 - 06 -16）协议将在以下章节中描述。

当接通探头时，需要2秒来稳定其内部电路。

在此之后，如果配置为数字模式，参数为“数字模式digital mode = 1”或“数字模式digital mode = 2”，则探测器准备接收来自主设备的命令或通过超级终端程序或类似程序手动接收命令。

接通后，对于数字模式= 1，电流回路将提供11 / 12 / 13 / 14/ 15 / 16 mA随所选刻度的变化。对于数字模式= 2，电流回路将提供8.5 mA。

6.4.1 B&c通信协议

使用简单的终端仿真程序（例如Hyperteminal）将探头连接到PC上进行数据管理和校准。

传播方式

代码系统	ASCII
每个字符的位数:	
-起始位	1
-数据位	8
-奇偶校验	没有奇偶校验
-停止位	1
错误检查（仅A命令）	BCC
速率	9600波特（默认）

Commands format using ID (01 ÷ 99) o (1 ÷ 99)

1 or 2 byte ID probe (01 ÷ 99 or 1 ÷ 99)

1 or 2 byte of command

n byte to be inserted if required by the command

1 byte <cr> (carriage return) end command

The probe transmits only if the ID sent is correct or is 00.



Do not use 00 ID if more than one probe is connected, to avoid overlap of the communication.

Commands format using ID + SNxxxxxx

1 or 2 byte ID probe (01 ÷ 99 or 1 ÷ 99)

8 byte serial number (SNxxxxxx)

1 or 2 byte of command

n byte to be inserted if required by the command

1 byte <cr> (carriage return) end command

The probe transmits only if the ID + serial number sent is correct or if it is 00 + serial number.



If the communication port is set to a different speed the probe will not communicate.



All the available commands are listed in the following pages.



The list of commands implemented in the transmitter is always available by sending the command Help.

COMMANDS USING ID

HELP

Command format: ID + H <cr>

Example: if ID=14 type 14H <cr> or 00H <cr>

By sending the command H the probe responds by sending a record containing the list of available commands with a brief description of their meaning.

```

-----
HELP MENU, COMMAND LIST          B&C ELECTRONICS
-----
C8X25  CONDUCTIVITY PROBE 4-2000mS Rev.fw:3.10  S/N:192589

00H <cr>  Help menu
00A <cr>  Acquisition
00Mx <cr> Digital mode:      0000          (0=analog 1=digital 2=dig.LP)
00Ox <cr> Analog out 4-20mA: 0001          (1=20mS 2=200mS 3=2000mS)
                                           (4=4mS 5=40mS 6=400mS)
00Kx <cr> Analog out EC,TDS: 0000          (0=EC 1=TDS)
00Fx <cr> TDS/EC factor:     0.670        (0.450-1.000)
00Xx <cr> Scalable output %: 0100        (10-100% full scale)
00RLx<cr> RT90% large signal 0002.s      (2-220s)
00RSx<cr> RT90% small signal 0010 s      (2-220s)
00Jx <cr> Temp. adjust      not done     0.0  (5.0°C max) (00JR reset)
00Gx <cr> Tref               0001        (1=20°C 2=25°C)
00Cx <cr> TC                 2.00 %/°C    (0.00-3.50%/°C)
00Vx <cr> Meas. with KCl TC: 0000        (0=no 1=yes momentary)
00Tx <cr> Standard solution: 102.1 mS    (0.000-2000 mS)
00Z <cr> Zero calibration:  OK           0.02 (10% fs max) (00ZR reset zero)
00S <cr> Sens. calibration: not done    100.0% (60-160%) (00SR reset sens)
00SK <cr> Sens. cal. KCl
00Dx <cr> Last cal date:     00/00/00     (XX/XX/XX, XX=00-99)
00Ix <cr> ID B&C:           0002        (01-99) or (1-99)
00Ex <cr> ID modbus:        0002        (1-243)
00Bx <cr> Baud rate:        0003        (1=2400 2=4800 3=9600 4=19200)

```

Type ID number or 00 before command. Example, if ID=15 type 15A or 00A <cr>
 Use 00A <cr> if only one probe is connected
 Query commands: 00H?,00Z?,00S?,00J?

PARAMETERS QUERY

Command format: **ID + H?** <cr>

Example: if ID=14 type 14H? <cr> or 00H? <cr>

By sending the command **H?** displays a record containing the code and the identifier followed by all parameters including the results of calibrations.

The record transmitted uses the "," as separator.

Record format:

```
C8X25- 09,FW:3.10,SN:192589,M:0000,O:0001,K:0000,F: 0.500,X:0100,RL:0
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
002,RS:0010,J:not done ± 0.0°C ,G:0001,C: 2.00,V:0001,T: 102.1,Z:no
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
t done 0.02mS ,S:not done 100.0% ,D:00/00/00,IA:0002,EA:0002,B
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
A:0003,BCC:4BB8,xx
```

C8X25	Probe code
02	Probe identification number (for ID < 10 visualization with blank/zero as first character according to the mode used in setting the ID)

Below are transmitted parameter values measured by the probe with the format NAME PARAMETER: VALUE.

FW:3.10	Firmware version
SN:192589	Probe's serial number
M:0000	Operating mode
O:0001	Analog output/scale setting
K:0000	TDS scale (OFF/ON)
F:0.500	TDS/conductivity factor
X:0100	Scalable output
RL:0002	Large software filter value
RS:0010	Small software filter value
J:not done 0.0°C	Temperature calibration outcome (not done, ok, error)
G:0001	Reference temperature
C: 2.00	Temperature coefficient value
V:0000	Measure with TC setted (0) or with KCl TC (1)
T:102.1	Sensitivity calibration solution value
Z:not done 0.02mS	Zero calibration outcome (not done, ok, error)
S:not done 100.0%	Sensitivity calibration outcome (not done, ok, error)
D:00/00/00	Last calibration date
IA:0002	ID B&C protocol
EA:0002	ID Modbus protocol

BA:0003	Baud rate
BCC:4BB8	BCC EEPROM check
xx	2 byte BCC of transmitted record

The record transmission is ended by <cr> <lf>.

EEPROM BCC check use

The EEPROM BCC check is a summary of the probe configuration state. When the parameters are set and calibration has been done, the value of the BCC remains constant until the next change of parameters or calibration. A variation of the BCC value without changing any parameters means the probe's configuration data has been altered.

BCC calculation

The BCC messages sent by the probe is calculated as the XOR of all the bytes making up the message (excluding <cr> and <lf>) and divided into 2 nibble.

The two nibbles are then transformed into their ASCII codes.

The BCC transmitted at the end of record is used to check the validity of records received.

ACQUISITION

Command format: **ID + A <cr>**

Example: if ID=14 type 14A <cr> or 00A <cr>

By sending the command **A**, the probe responds by sending a record containing the code, the ID, date, time, and the value of all the measures.

Record format

```
C8X25- 09 0.0 01/01/01 00:00:00 ± 200.0mS ± 100.0ppt ± 18.5°C ±
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
0.500 ± 20°C ± 2.00%/°C 18/11/10xx
```

C8x25	Probe code
09	Probe ID
0.0	Power voltage (not implemented)
01/01/01	Date (not implemented)
00:00:00	Time (not implemented)

Below are transmitted the parameter values measured by the transmitter with the following format:

Measuring	- Sign of measure (if positive is sent a blank) Value of measure (6 characters - right alignment)
Measuring unit	- 4 characters - left alignment - 1 blank (ASCII 32)
± 200.0 mS	Conductivity value

± 100.0 ppt	TDS value
± 18.5 °C	Temperature
± 0.500	TDS/conductivity factor
± 20 °C	Reference temperature
± 2.00 %/°C	Temperature coefficient

At the end of the record, the probe sends the date the last calibration procedure, then 2 bytes containing the BCC of the string sent.

18/11/10	Last calibration date
xx	2 byte BCC

The record transmission is ended by <cr> <lf>.

BCC calculation

The BCC messages sent by the transmitter is calculated as the XOR of all the bytes of the message (excluding <cr> and <lf>) and divided into two nibbles.

The two nibbles are then transformed into their ASCII codes.

BCC use

The BCC can be used if you want to create a master program that interrogates the probe. The BCC is used to check the validity of records received.

DIGITAL MODE

Command format: **ID + M + x <cr>**

Example: if ID=14 and digital mode = 1 type 14M1 <cr> or 00M1 <cr>

Response of the unit: <cr> <lf> **ID + M + x <cr> <lf>** command executed correctly

Response of the unit: none command failed

The probe can be configured to operate in digital mode (digital mode = 1 or 2) or in analog 4-20 mA mode (digital mode = 0).



For this command, and for all the following commands the response of the sensor is a replica of the command received with the addition of a <lf> line feed (head) at the beginning and end of the response.

ANALOG OUTPUT

Command format: **ID + O + x <cr>**

Example: if ID=14 and analog out = 40.00 mS scale type 14O5 <cr> or 00O5 <cr>

Response of the unit: `<cr> <lf> ID + O + x <cr> <lf>` command executed correctly
Response of the unit: none command failed

The 4-20 mA analog output can be combined with one of the 6 conductivity or TDS scales.

Set parameter:

x = 1 for 20.00 mS or 10.00 ppt scale
x = 2 for 200.0 mS or 100.0 ppt scale
x = 3 for 2000 mS or 1000 ppt scale
x = 4 for 4,000 mS or 2,000 ppt scale
x = 5 for 40.00 mS or 20.00 ppt scale
x = 6 for 400.0 mS or 200.0 ppt scale

CONDUCTIVITY / TDS ANALOG OUTPUT

Command format: `ID + K + x <cr>`

Example: if ID=14 and analog out TDS scale type 14K1 `<cr>` or 00K1 `<cr>`

Response of the unit: `<cr> <lf> ID + K + x <cr> <lf>` command executed correctly
Response of the unit: none command failed

Set parameter:

x=0 for conductivity
x=1 for TDS

To check if the entered value has been received, enter command **H**.

The enabling of the TDS measurement acts on the 4-20mA analogue retransmission.

SCALE FACTOR EC / TDS

Command format: `ID + F + x <cr>`

Example: if ID=14 and scale factor is 0.550 type 14X0.550 `<cr>` or 00X0.550 `<cr>`

Response of the unit: `<cr> <lf> ID + F + x <cr> <lf>` command executed correctly
Response of the unit: none command failed

To check whether the entered value has been received type command **H**.

OUTPUT SCALE FACTOR

Command format: `ID + X + x <cr>`

Example: if ID=14 and scale factor is 50 % type 14X50 `<cr>` or 00X50 `<cr>`

Response of the unit: `<cr> <lf> ID + X + x <cr> <lf>` command executed correctly
Response of the unit: none command failed

To check whether the entered value has been received type command **H**.

Set parameter:

x=1 for Tref = 20 °C

x=2 for Tref = 25 °C

To check whether the entered value has been received type command H? or H.

TEMPERATURE COEFFICIENT

Command format: **ID + C + x <cr>**

Example: if ID=14 and temperature coefficient 2.10 %/°C type 14C2.10 <cr> or 00C2.10 <cr>

Response of the unit: <cr> <lf> ID + C + x <cr> <lf> command executed correctly

Response of the unit: none command failed

To check whether the entered value has been received type command H? or H.

TEMPORARY MEASUREMENT WITH KCL TC

Command format: **ID + V + x <cr>**

Example: if ID=14 and you need to measure using KCl TC type 14V1 <cr> or 00V1 <cr>

Response of the unit: <cr> <lf> ID + V + x <cr> <lf> command executed correctly

Response of the unit: none command failed

Set parameter:

x=0 for setted TC

x=1 for KCl TC

The command allows to calibrate the sensitivity (using the command **ID + S <cr>**) with a standard KCl solution in order to read the conductivity value before and after calibration by applying the TC of the KCl and not the one set.

To check whether the entered value has been received type command H? or H.

Once the sensitivity calibration is completed, the TC of the KCl will be maintained for the next 20 seconds to allow verification of the correct calibration carried out with the KCl standard. After 20 seconds the TC will be automatically reset to the set use TC.

Also the reset sensitivity operation resets to the use CT after the expected 20 seconds.

If the request to measure with the TC of the KCl is activated and within 30 minutes the sensitivity calibration is not performed, the TC is automatically returned to the user TC.

To instantly go back to measuring with the TC setting you need to perform the sensitivity calibration type 14V0 <cr> or 00V0 <cr>.

STANDARD SOLUTION VALUE

Command format: **ID + T + x <cr>**

Example: if ID=14 and the calibration solution is 102.1 mS type 14T102.1 <cr> or 00T102.1 <cr>

Response of the unit: <cr> <lf> ID + T + x <cr> <lf> command executed correctly


Response of the unit: none command failed

To check whether the entered value has been received type command **H?** or **H**.

ZERO CALIBRATION

Perform the zero calibration operation with the dry cell.

Zero calibration is performed on all scales from the lowest scale.

 *Zero calibration should be performed before sensitivity calibration.*

Command format: **ID + Z <cr>**

Example: if ID=14 type 14Z <cr> or 00Z <cr>


Response of the unit: <cr> <lf> **ID + Z <cr>** <lf> command executed correctly

Response of the unit: none command failed

Calibration messages:

'ok' calibration done
'error' error during calibration
'not done' default factory calibration value

To check the result of the zero calibration using the **Z?**, **H?** or **H**.

 *If the operation has failed (error) is kept the value of the previous zero.*
Verify that the cell is perfectly dry and clean.

ZERO CALIBRATION RESET

Command format: **ID + ZR <cr>**

Example: if ID=14 type 14ZR <cr> or 00ZR <cr>

Response of the unit: <cr> <lf> **ID + ZR <cr>** <lf> command executed correctly

Response of the unit: none command failed

This command allows you to restore the zero value to the default values.

Verify the outcome of the operation with the command **Z?**, **H?** or **H** and check the line "Zero calibration: not done".

ZERO CALIBRATION TEST

Command format: **ID + Z? <cr>**

Example: if ID=14 type 14Z? <cr> or 00Z? <cr>

Response of the unit: <8 characters outcome> command executed correctly
 >blank> <7 characters value>
 <4 characters measure
 unit><cr> <lf>

Response of the unit: none command failed

Record format

```
ok      ± 0.10mS
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
```

Possible results: ok / not done / error.

SENSITIVITY CALIBRATION

Sensitivity calibration operation in a standard solution or in a known conductivity solution.

The value of the solution must be entered using the "Value of the calibration solution" command.

The TC (temperature coefficient) used during calibration is that of the KCl if the parameter **V** is set to 1, if **V** is equal to 0, the use TC is used.

The use of the TC of the KCl is temporary and after 20 seconds from the calibration the user TC is automatically reset.

The zero calibration is performed on all scales.

Command format: **ID + S <cr>**

Example: if ID=14 type 14S <cr> or 00S <cr>

Response of the unit: <cr> <lf> ID + S <cr> <lf> Command executed correctly

Response of the unit: none Command failed

Calibration messages:

'ok'	calibration done
'error'	error during calibration
'not done'	default factory calibration value

To check the result of the sensitivity calibration using the **S?**, **H?** or **H**.

Send a command **A** to test if calibration was successful. The reading should be as close as possible to the value of the solution used for calibration.



If the operation has failed (error) check that the probe is actually immersed in the standard solution.

Inspect the state of the surface of the sensor, if necessary, clean the surface with a soft cloth.

In the case of a negative result, the probe restores the previous sensitivity value.

SENSITIVITY CALIBRATION WITH KCl

Sensitivity calibration operation in standard KCl solution.

The value of the solution must be entered using the "Value of the calibration solution" command.

The TC (temperature coefficient) used during calibration is that of KCl.



This command allows to calibrate directly applying the TC of the KCl without setting the reading with the KCl (Measurement with TC of the KCl). The value then measured before calibration will not be the correct value of the standard but a different value due to the use of the TC of use instead of the TC of the KCl.

Once the sensitivity calibration is completed, the TC of the KCl will be maintained for the next 20 seconds to allow verification of the correct calibration carried out with the KCl standard. After 20 seconds the TC will be automatically returned to the user TC.

The zero calibration is performed on all scales.

Command format: **ID + SK <cr>**

Example: if ID=14 type 14SK <cr> or 00SK <cr>

Response of the unit: <cr> <lf> **ID + SK <cr>** <lf>

Command executed correctly

Response of the unit: none

Command failed

Calibration messages:

'ok'	calibration done
'error'	error during calibration
'not done'	default factory calibration value

To check the result of the sensitivity calibration using the **S?**, **H?** or **H**.

Send a command **A** to test if calibration was successful. The reading should be as close as possible to the value of the solution used for calibration.



If the operation has failed (error) check that the probe is actually immersed in the standard solution.

Inspect the state of the surface of the lenses and, if necessary, clean the surface with a soft cloth.

In the case of a negative result the probe restores the previous values of sensitivity.

SENSITIVITY RESET

Command format: **ID + SR <cr>**

Example: if ID=14 type 14SR <cr> or 00SR <cr>

Response of the unit: <cr> <lf> **ID + SR <cr>** <lf>

command executed correctly

Response of the unit: none

command failed

This command allows to return to the default sensitivity value of 100.0 %.

Verify the outcome of the operation through the command S?, H? o H and check the line "Sens. calibration: not done".

SENSITIVITY CALIBRATION TEST

Command format: ID + S? <cr>

Example: if ID=14 type 14S? <cr> or 00S? <cr>

Response of the unit: <8 characters outcome> command executed correctly
>blank> <7 characters value>
<4 characters measure
unit><cr> <lf>

Response of the unit: none command failed

Record format

```
ok           ± 100.0%
.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|.....+.....|
```

Possible results: ok / not done / error.

LAST CALIBRATION DATE

Command format: ID + D + XX/XX/XX <cr> (XX = 00 ÷ 99)

Example: if ID=14 and the date to be inserted is 11/05/18 type 14D11/05/18 <cr> or 00D11/05/18 <cr>

Response of the unit: <cr> <lf> ID + D + XX/XX/XX <cr> command executed correctly
<lf>

Response of the unit: none command failed

This command allows to store the last calibration date.

The date field is 8 characters to be written in the proposed format.

ID OF THE B&C PROTOCOL

Command format: ID + I + x <cr>

Example: if ID=14 and the new ID (identification) to enter is 07 type 14I07 <cr> or 00I07 <cr>

Response of the unit: <cr> <lf> ID + I + x <cr> <lf> command executed correctly

Response of the unit: none command failed

If ID is less than 10 depending on the input mode the first digit will then be displayed as blank or zero in controls 00A and 00H?.

If you want a view with a zero first you must enter the ID with 0 as 00I07 but if you want it with the blank you have to type it without 0 example 00I7.

The probe activates the new ID immediately after the response to the command.

ID OF THE MODBUS PROTOCOL

Command format: **ID + E + x <cr>**

Example: if ID=14 and the new ID (identification) to enter is 07 type 14E07 <cr> or 00E07 <cr>

Response of the unit: <cr> <lf> ID + E + x <cr> <lf> command executed correctly

Response of the unit: none command failed

The probe activates the new ID immediately after the response to the command.

BAUD RATE

Command format: **ID + B + x <cr>**

Example: if ID=14 and the new speed is 2 = 4800 baud type 14B2 <cr> or 00B2 <cr>

Response of the unit: <cr> <lf> ID + B + x <cr> <lf> command executed correctly

Response of the unit: none command failed

Set parameter:

x=1 for 2400 baud

x=2 for 4800 baud

x=3 for 9600 baud

x=4 for 19200 baud

The probe activates the new baud rate immediately after the response to the command.

COMMANDS USING ID + SNxxxxxx

From release R3.00 it has been added the possibility to query the probes by inserting the serial number of the probe in addition to the ID for **all the commands provided**.

Example: the command to acquire the measurement of a probe with ID=14 and SN123456 can be performed with:

interrogation using ID 14A <cr> or 00A <cr>

interrogation using ID+SNxxxxxx 14SN123456A <cr> or 00SN123456A <cr>

The interrogation with ID + SNxxxxxx becomes a unique command thus allowing to be able to insert more than 99 devices on the network, limit imposed by the commands with ID.

A command is also provided with serial number broadcast ID + SN000000 to which all the probes respond.

SEARCH PROBE TYPE, ID AND SERIAL NUMBER

Command format: **ID + SN? <cr>**

Example: if the ID is known (ID=14) type 14SN? <cr> to know code and serial number or type 00SN? <cr> to search all the probes in the network.

Response of the unit: <6 characters code> <2 characters ID> <6 characters serial number> <2 characters BCC>
<cr> <lf> command executed correctly

Response of the unit: none command failed

Record format

```
TU8325,14,123456,xx
....+. ....|. ....+. ....|
```

This command allows to search all the probes in a network.

The probes respond by providing their identity: code, ID, serial number.

The probe response occurs after a random time chosen by the probe itself between 8 time intervals: 0 ms, 200 ms, 400 ms, 600 ms, 800 ms, 1000 ms, 1200 ms, 1400 ms to avoid as much as possible an overlap of the answers when there are more probes on the network.

If there are more probes, some overlap of communication will be unavoidable.

The master device must manage the probes search by disabling the commands of the probes it has found, repeating the search command several times until it has found all the probes in the network.

At this point the master can re-enable the commands of the probes he has found.

To disable and re-enable the probe commands, see the command **ID + SNxxxxxx + MUX <cr>**.

The automatic management of probe probes is implemented in the MC 6587 and MC 7687 instruments of the B&C Electronics.

DISABLE/ENABLE COMMANDS USING ID

Command format: **ID + SNxxxxxx + MUX <cr>**

Example: to disable commands using ID of a probe with ID=14 and serial number 123456 type 14SN123456MU1 <cr> or 00SN123456MU1 <cr>

Response of the unit: <cr> <lf> **ID + SNxxxxxx + MUX** command executed correctly
<cr> <lf>

Response of the unit: none command failed

Set parameter:

x=0 to enable commands using ID

x=1 to disable the commands using ID

When the probe is disabled to commands using ID:

- can only execute commands with **ID + SNxxxxxx**;
- does not run the probe search command **ID + SN?**.

6.4.2 MODBUS PROTOCOL

On the probe, in addition to the ASCII B&C protocol, is implemented the Modbus RTU protocol limited to the function 03, 06, and 16.

In Modbus communication network the probe operates as a slave device.

RTU transmission mode

Coding system	8-bit binary
Number of bits per character:	
- start bits	1
- data bits (minus sign before)	8
- parity	no parity
- stop bits	1
Errors verification	CRC-16

RTU messages format

Pause transmission	duration 3,5 bytes
Address	1 byte (8 bits)
Function	1 byte (8 bits)
Data	N bytes (N x 8 bits)
Errors verification	2 bytes (16 bits)
Pause transmission	duration 3,5 bytes

For a correct synchronization of the transmission the receiving unit interprets the end of a message when it doesn't receive any characters (bytes) for a time equivalent to the transmission of 3.5 characters (bytes).

MODBUS FUNCTION 03 (0x03)

Function 03 (MASTER QUERY)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	03 (read holding register)
Start address data HI	1 byte	Start address of registers
Start address data LO	1 byte	
Number of registers HI	1 byte	Number of registers (2 byte x register)
Number of registers LO	1 byte	
Errors verification	2 bytes	CRC-16

The transmitter considers valid the message if CRC-16 valid, ID valid and function=03.

Function 03 (SLAVE ANSWER)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	03 (read holding register)
Number of byte of sent data	1 byte	2x number of sent registers
N byte of data	N byte	Values of registers
Error verification	2 bytes	CRC-16

If you query requesting registers outside the defined limits, the probe answers assigning zero to all of the registers out of range.

If an error occurs in the request, the response takes the following form:

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	0x83 (read holding register + error)
Error	1 byte	2 = illegal data address 3 = illegal data value
Error verification	2 bytes	CRC-16

Time between the end of the query and the beginning of the response about 100 ms.

MODBUS FUNCTION 06 (0x06)

Function 06 (MASTER QUERY)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	06 (write single register)
Address data HI	1 byte	Address of the register
Address data LO	1 byte	
Value of the register HI	1 byte	Value to be written
Value of the register LO	1 byte	
Errors verification	2 bytes	CRC-16

The probe considers valid the message if CRC-16 valid, ID valid and function=06.

Function 06 (SLAVE ANSWER)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	06 (write single register)
Address data HI	1 byte	Address of the register
Address data LO	1 byte	
Value of the register HI	1 byte	Value to be written
Value of the register LO	1 byte	
Errors verification	2 bytes	CRC-16

When writing some calibration commands (eg zero calibration), the probe responds to the request and then remains silent for the time necessary to perform the operation.

If an error occurs in the request, the response takes the following format:

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	0x86 (write single register + error)
Error	1 byte	2 = illegal data address 4 = slave device failure
Error verification	2 bytes	CRC-16

Time between the end of the query and the beginning of the response about 100 ms.

MODBUS FUNCTION 16 (0x10)

Function 16 (MASTER QUERY)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	16 (write multiple registers)
Start address data HI	1 byte	Start address of registers
Start address data LO	1 byte	
Number of registers HI	1 byte	Number of registers (2 byte x register)
Number of registers LO	1 byte	
Number of byte	1 byte	2 byte per register
Value of registers	n byte	n = 2 byte x number of registers
Errors verification	2 bytes	CRC-16

The transmitter considers valid the message if CRC-16 valid, ID valid and function=16.

Function 16 (SLAVE ANSWER)

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	16 (write multiple registers)
Start address data HI	1 byte	Start address of registers
Start address data LO	1 byte	
Number of registers HI	1 byte	Number of registers (2 byte x register)
Number of registers LO	1 byte	
Errors verification	2 bytes	CRC-16

When writing some calibration commands (i.e. zero calibration), the probe responds to the request and then remains silent for the time necessary to perform the operation.

If an error occurs in the request, the response takes the following format:

Address	1 byte	1 ÷ 243 (probe ID)
Function	1 byte	0x90 (write multiple registers + error)
Error	1 byte	2 = illegal data address 3 = illegal data value 4 = slave device failure
Error verification	2 bytes	CRC-16

Time between the end of the query and the beginning of the response about 100 ms.

BROADCAST COMMANDS

Modbus 06 and 16 queries can be made by the master in broadcast mode.

The broadcast mode consists in sending the message with the identifier 0, all the probes perceive the message and execute the command but do not respond to the master in order not to create conflicts.

DATA THROUGH MODBUS FUNCTION 03

MEASURE AND STATE (address 0x00xx)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
1	0x0000	Conductivity - scale 1/2/3 - scale 4/5/6	0 ÷ 2000 0 ÷ 4000	mS	a a	IS	R
2	0x0001	TDS - scale 1/2/3 - scale 4/5/6	0 ÷ 1000 0 ÷ 2000	ppt	a a	IS	R
3	0x0002	Scale	1 ÷ 6 ^b			IS	R
4	0x0003	Temperature °C	0 ÷ 1000	0.1	0.0 ÷ 100.0 °C	IS	R
5	0x0004	TDS/conductivity conversion factor	450 ÷ 1000	0.001	0.450 ÷ 1.000	IS	R
6	0x0005	Reference temperature	20 / 25	1		IS	R
7	0x0006	Temperature coefficient	0 ÷ 350	0.01	0.00 ÷ 3.50 %/°C	IS	R
8	0x0007	BCC EEPROM	0 ÷ 65535	1	0 ÷ 65535	I	R

^a = depend on the configured scale

^b = 1: 0.00 ÷ 20.00 mS scale / 2: 0.0 ÷ 200.0 mS scale / 3: 0 ÷ 2000 mS scale / 4: 0.000 ÷ 4.000 mS scale / 5: 0.00 ÷ 40.00 mS scale / 6: 0.0 ÷ 400.0 mS scale

IS = integer signed / I = integer

R = read / W = write

ZERO CALIBRATION (address 0x010x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
9	0x0102	Zero command/flag - zero cal - reset zero - flag zero cal	0x5A00 0x5A52 0 = not done 1 = ok 2 = error	1 1 1		IS	W W R
10	0x0103	Zero value - scala 1/2/3 - scala 4/5/6	-200 ÷ 200 -400 ÷ 400		a a	IS	R

^a = depend on the configured scale

IS = integer signed / I = integer

R = read / W = write

SENSIBILITY CALIBRATION (address 0x011x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
11	0x0110	Measure with TC of KCl	0 ÷ 1	1		IS	R/W
12	0x0112	Decimal point standard sens.	1 ÷ 3	1		IS	R/W
13	0x0113	Standard sens - decimal point = 0 - decimal point = 1 - decimal point = 2 - decimal point = 3	0 ÷ 4000 0 ÷ 4000 0 ÷ 4000 0 ÷ 4000	0.1 0.01 0.001	0.0 ÷ 400.0 NTU 0.00 ÷ 40.00 NTU 0.000 ÷ 4.000 NTU	IS	R/W
14	0x0114	Sens command/flag - sens cal - sens cal KCl - reset sens - flag sens cal	0x5300 0x534B 0x5352 0 = not done 1 = ok 2 = error	1 1 1		IS	W W W R
15	0x0115	Sens value	600 ÷ 1600 %	0.1	60.0 ÷ 160.0	IS	R

IS = integer signed / I = integer

R = read / W = write

CHECK CALIBRATION (address 0x012x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
16	0x0120	Temp command/flagl - reset temp - flag temp cal	0x4A52 0 = not done 1 = OK 2 = error	1 1	IS	I	W R
17	0x0121	Temp. adj Temp zero value	-50 ÷ 500 -50 ÷ 50	0.1 0.1	-5.0 ÷ 50.0 °C -5.0 ÷ 5.0 °C	IS	W R

IS = integer signed / I = integer

R = read / W = write

SETUP (address 0x020x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
18	0x0200	Large filter	2 ÷ 220	1 s	2 ÷ 220 s	IS	R/W
19	0x0201	Small filter	2 ÷ 220	1 s	2 ÷ 220 s	IS	R/W

IS = integer signed / I = integer

R = read / W = write

C 8X2X SETUP (address 0x021x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
20	0x0212	Temperature coefficient	0 ÷ 350	1	0 ÷ 3.50 %/°C	IS	R/W
21	0x0213	Reference temperature	20 / 25			IS	R/W

IS = integer signed / I = integer

R = read / W = write

CONFIGURATION (address 0x030x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
22	0x0300	Digital mode	0 = analog 1 = digital 2 = dig. low power	1		IS	R/W
23	0x0301	Scales	1 ÷ 6	1		IS	R/W
24	0x0302	Scalable output	10 ÷ 100	1	10 ÷ 100 %	IS	R/W
25	0x0303	Baud rate	1 = 2400 2 = 4800 3 = 9600 4 = 19200	1		IS	R/W
26	0x0304	ID B&C	1 ÷ 99	1		IS	R/W
27	0x0305	ID Modbus RTU	1 ÷ 243	1		IS	R/W

IS = integer signed / I = integer

R = read / W = write

SPECIFIC CONFIGURATION C 8X2X (address 0x031x)

	Mod-bus address	Parameter	Range	Unit	Scale	Data type	R/W
28	0x0310	TDS	0=off / 1=on	1		IS	R/W
29	0x0311	TDS factor	450 ÷ 1000		0.450 ÷ 1.000 1/S	IS	R/W

IS = integer signed / I = integer

R = read / W = write

INFO PROBE (address 0x040x)

	Mod- bus ad- dress	Parameter	Range	Unit	Scale	Data type	R/W
30	0x0401	Codice	6 characters			I	R
31	0x0404	Serial number	6 characters			I	R
32	0x0407	Rev. fw	4 characters			I	R
33	0x0409	Last cal date (1)	00 ÷ 99	1		IS	R/W
34	0x040A	Last cal date (2)	00 ÷ 99	1		IS	R/W
35	0x040B	Last cal date (3)	00 ÷ 99	1		IS	R/W

IS = integer signed / I = integer

R = read / W = write

Use of BCC EEPROM

The EEPROM BCC check is the probe configuration state synthesis. After setting the parameters and carry out the calibration the value of the BCC remains constant until the next change of parameters or calibration.

A variation of BCC in the absence of changes warns that an alteration has taken place in the probe configuration data.

7 维护

必须定期检查和清洗探头下端部分。结垢会减少了待测样品的体积，改变了探头的灵敏度。用湿布清除任何沉淀物，如果沉淀物是钙化的，则使用软清洁剂或高度稀释的酸。清洗的频率取决于使用的类型、性质和测量样品的浓度。

建议在零点和灵敏度校准前进行清洗。



避免拆卸电缆压盖的操作，拆卸外壳的操作仅限于制造商维修使用，如果有操作人员自行拆卸导致损坏内部电路，则保修会失效。

7.1 校准

该探头提供了零点和灵敏度的工厂校准，用已知的标准溶液完成。

为了保证测量的准确性，对探头进行检查和定期校准是必要的。

在进行新的校准之前，测量单元的清洁程度是一个重要的检查因素。如有必要，用软布擦拭测量窗。

建议在灵敏度校准前先进行零点校准。

零校准

零点校准操作必须通过将探头清洁干燥地放置在空气中来进行。

校准在所选刻度的 $\pm 10\%$ 范围内进行，并按照“零校准（第30页）”章节中描述的程序在所有刻度上自动执行。

灵敏度校准

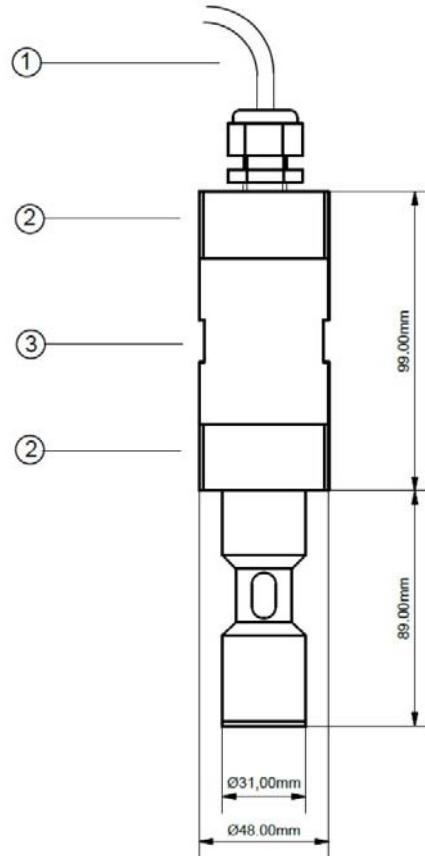
按照“SENSITIVITY校准（第31页）”和“用KCl进行灵敏度校准（第32页）”章节中的程序，在KCl标准溶液中完成。

零点复位和灵敏度校准

要将零位和灵敏度重置为出厂设置，请按照“零校准RESET（第30页）”和“SENSITIVITYRESET/灵敏度校准（第32页）”章节中描述的程序进行。

8 安装图纸

8.1 C 8825.4 - 尺寸



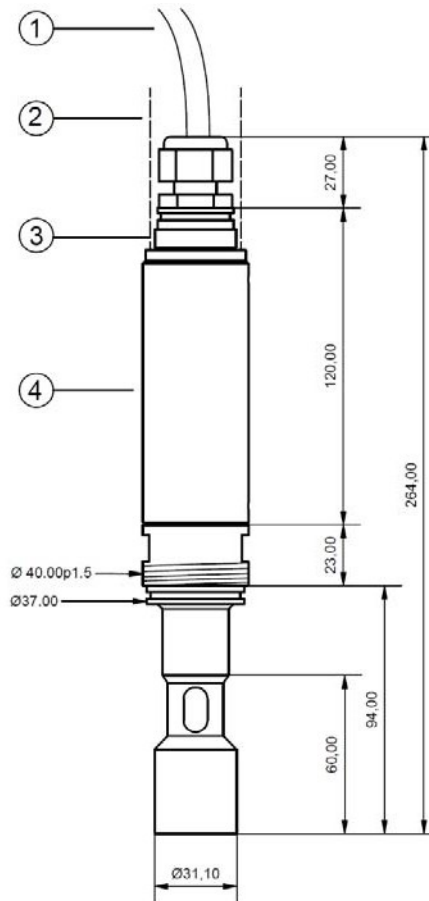
描述

- 1 电缆
- 2 1- 1/2" NPT 螺纹
- 3 外壳

接线

- 屏蔽 不接
- 黄 RS485 A (+)
- 灰 RS485 B (-)
- 棕 不接
- 绿 + 两线制
- 白 - 两线制 / COM RS485

8.2 C 8325.5 – 尺寸



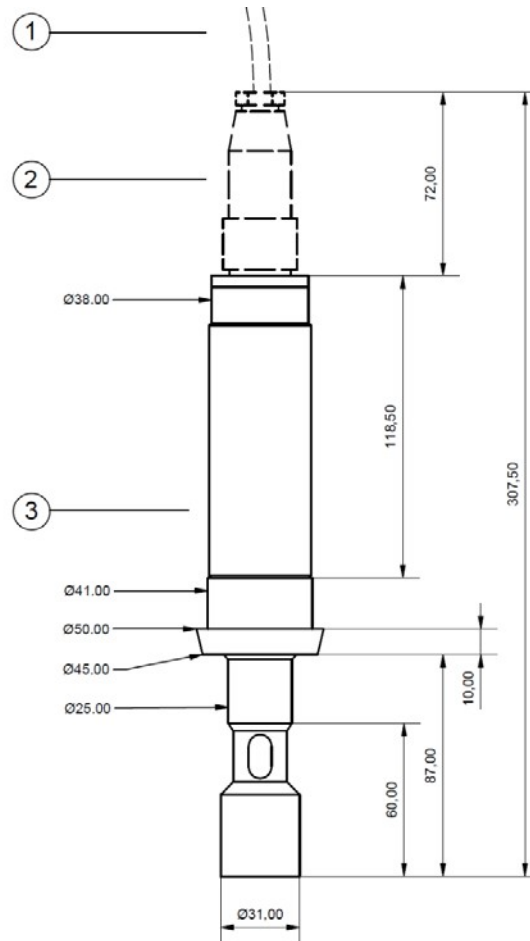
描述

- 1 电缆
- 2 延长管 (可选项)
- 3 螺纹
- 4 外壳

接线

- 屏蔽 不接
- 黄 RS485 A (+)
- 灰 RS485 B (-)
- 棕 不接
- 绿 + 两线制
- 白 - 两线制 / COM RS485

8.3 C 8520.5 – 尺寸



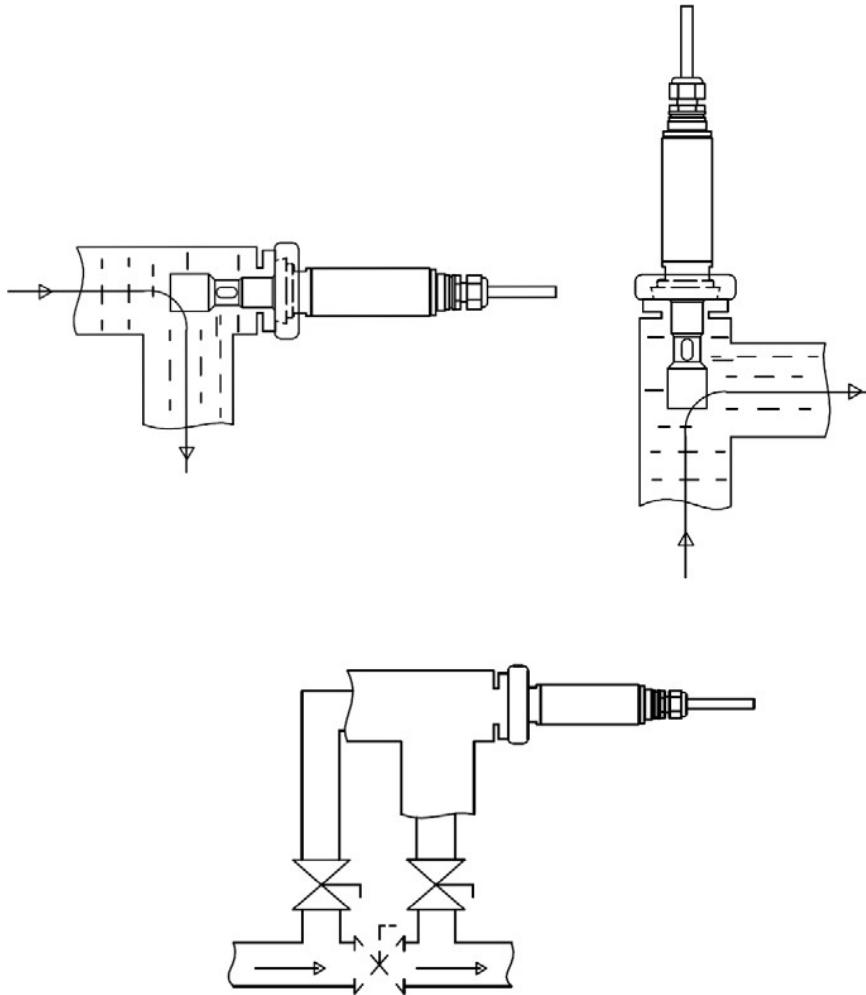
描述

- 1 电缆
- 2 电缆接头
- 3 外壳

接线

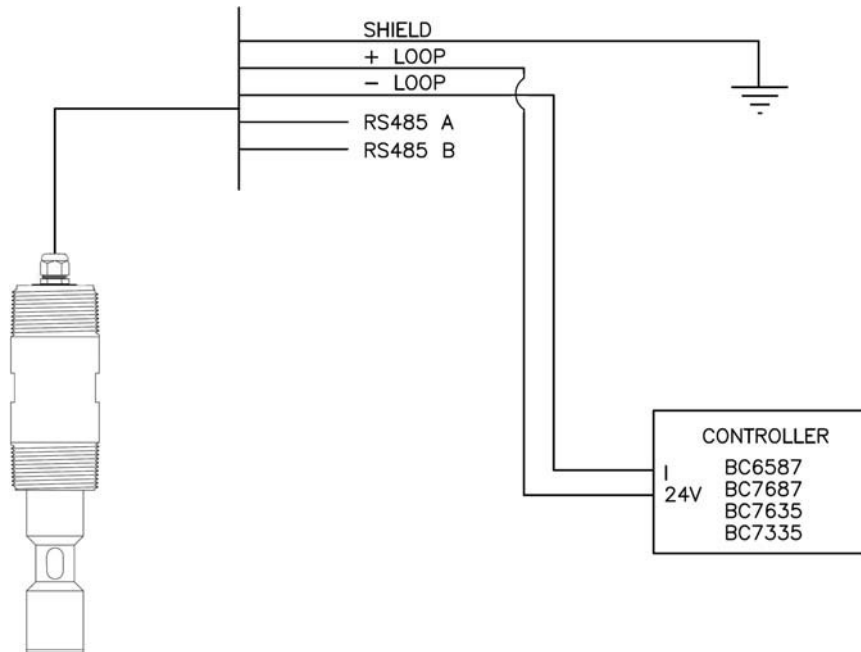
- 屏蔽 不接
- 黄 RS485 A (+)
- 灰 RS485 B (-)
- 棕 不接
- 绿 + 两线制
- 白 - 两线制 / COM RS485

8.4 C 8325.5 - C 8520.5 – 安装

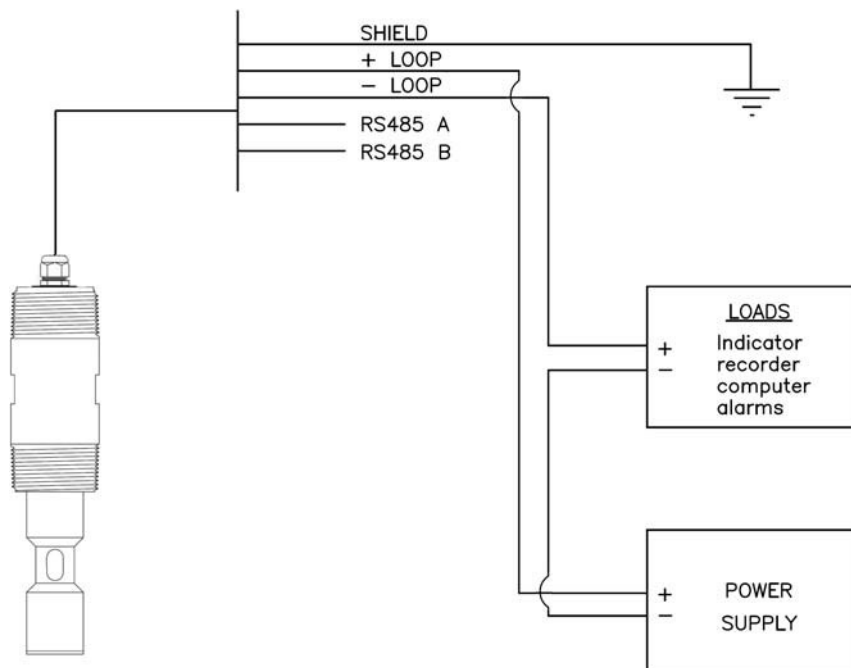


8.5 模拟输出接线图

图中所示的连接适用于所有型号。



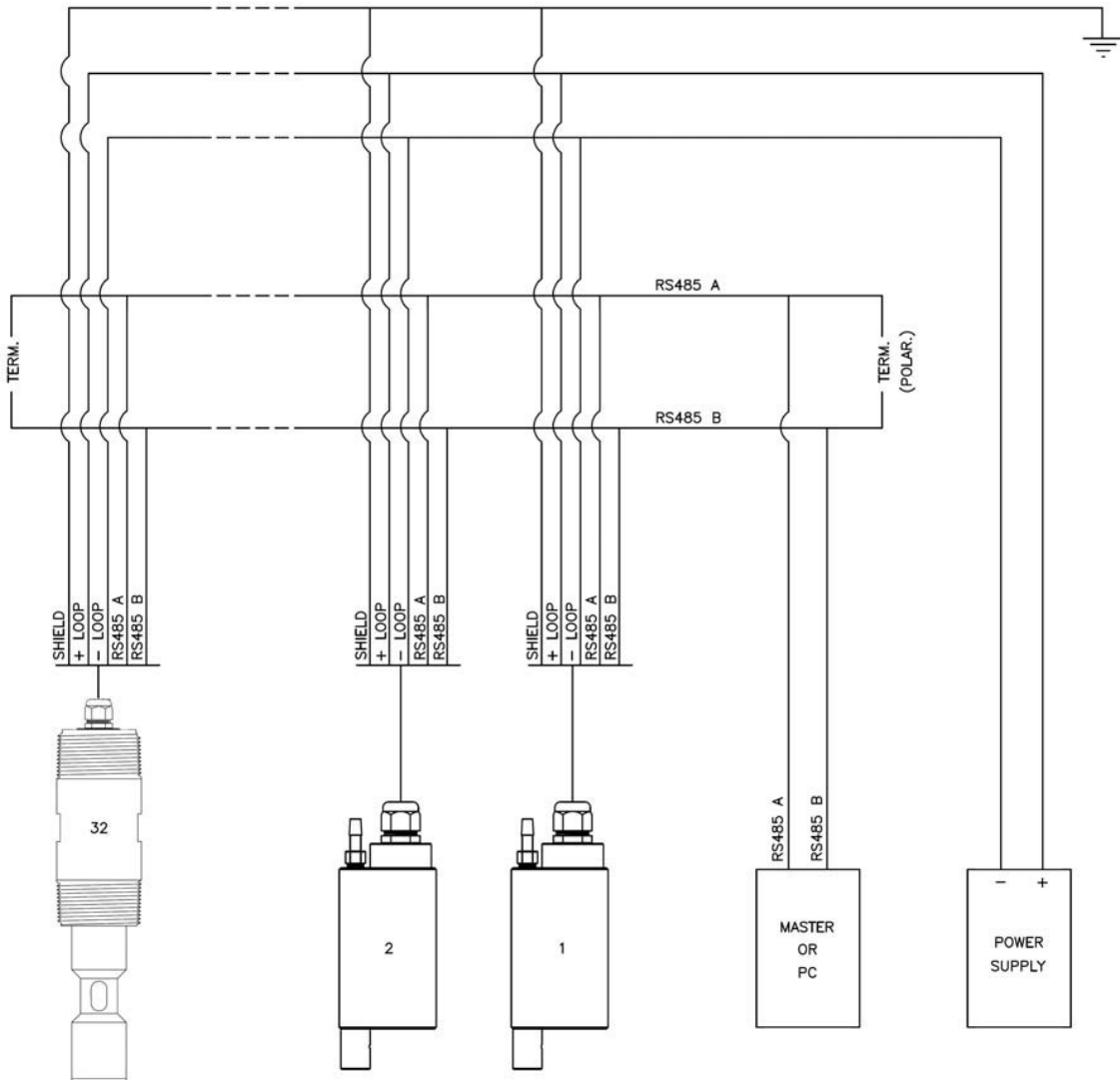
连接到B&C电子公司的仪器



连接PLC或数据记录仪

8.6 通讯接口的接线

图中所示的连接适用于所有型号。



9 保修

- 1 你的产品自购买之日起保修5年，如果是由于制造缺陷造成的故障。
- 2 如果由于安装或维护不当而造成产品损坏或变质，保修无效。
- 3 保修只包括在制造厂实验室免费维修。
- 4 B&C电子不对因滥用仪器和产品而造成的任何损害负责。

10 维修

为了更快、更高效地维修，建议填写维修服务“信息卡”，并附上“维修单”。

- 1 预估费用，如果客户要求，如果确认维修，则免费。否则，统一费率将导致对所进行的分析工作和所发生的费用收费。
- 2 需要修理的产品必须寄给B&C电子，运费预付。代表客户发生的任何未事先约定的费用将被收取。
- 3 在下列情况下，我们的销售部门将向客户提交维修估价或提供重新安置：
 - 与产品成本相比，维修费用被认为过高；
 - 修理在技术上不可能或不可靠。
- 4 为了缩短修理后产品的交货时间，除非客户另有报价或安排，否则货物将由快递公司以出厂、预付运费的方式运输。

INFORMATION SHEET
for service repairs

In the event of a fault, we recommend you contact our repair service, to photocopy and complete this information sheet to be attached to the product to be repaired.

ESTIMATE

REPAIR

COMPANY NAME

ADDRESS

ZIP

TOWN

REFER TO MR/MRS

TELEPHONE

MODEL

S/N

DATE

Consult the instruction manual to identify the area of the defect and/or describe it:

SENSOR

ANALOG OUTPT

POWER SUPPLY

SET POINT

CALIBRATION

RELAYS CONTACTS

DISPLAY

INTERMITTENT PROBLEM

DESCRIPTION OF THE DEFECT

.

.

.

.

.

.



B&C Electronics s.r.l. – Via per Villanova 3 – 20866 Carnate (MB) – Italia
Tel. +39 039 631 721 – Fax +39 039 607 6099 – bc@bc-electronics.it – www.bc-electronics.it