

## Conductivity Custom Control Unit



### **Purpose:**

This Custom Control Unit has been developed for measuring conductivity and total dissolved solids in a solution, and employs the Atlas Scientific Conductivity circuit to interface with the conductivity probe. The unit transmits the data back to the DataWorks App via a Bluno Nano microcontroller and is powered via 5V USB.

### **Functional Description:**

- The unit is capable of reporting electrical conductivity, total dissolved solids or salinity (PSS-78) and is user selectable. The conductivity is reported by default
- The unit will continuously send data to the DataWorks App approximately once per second.
- The unit can be calibrated for the connected conductivity probe. There are three available calibration points. A dry calibration, and a high and low level calibration. Previous calibrations can be cleared from the system and returned to the factory defaults.
- The unit is compatible with electrodes that have a K values of 0.1, 1.0 and 10.0. By default, we have setup this unit for an electrode with a K = 1.093
- The reported conductivity can compensate for temperature changes. The temperature is set at 25°C by default and each time the device is powered up.
- All commands are case sensitive. If the unit receives any other command an error will be returned.

### **Package Contents:**



- 1 x Mini USB to USB power cable.
- 1 x Custom Control Unit
- 1 x Conductivity Electrode (K = 1.093)

## Commands:

Command	Action	Response
CC	Clear previous calibration	C-OK
CD	Perform dry calibration	C-OK
CL###	Low-point calibration. Where ### is the conductivity of the calibration solution. (i.e. 12800 for the provided solution)	C-OK
CH###	Where ### is the conductivity of the calibration solution. (i.e. 80000 for the provided solution)	C-OK
PE	Report EC data	P-OK
PT	Report TDS data	P-OK
PS	Report salinity data	P-OK
T###	Temperature Compensation. ### is temperature in Celsius (i.e. T21.5 for a temperature of 21.5°C)	T-OK
K###	Sends K value to unit. ### is from 0.1 and 10 (The unit has already been set to a K of 1.093 for the provided probe)	K-OK

(Note: The temperature is reset to 25.0°C each time the unit is powered down – and will need to be reset)

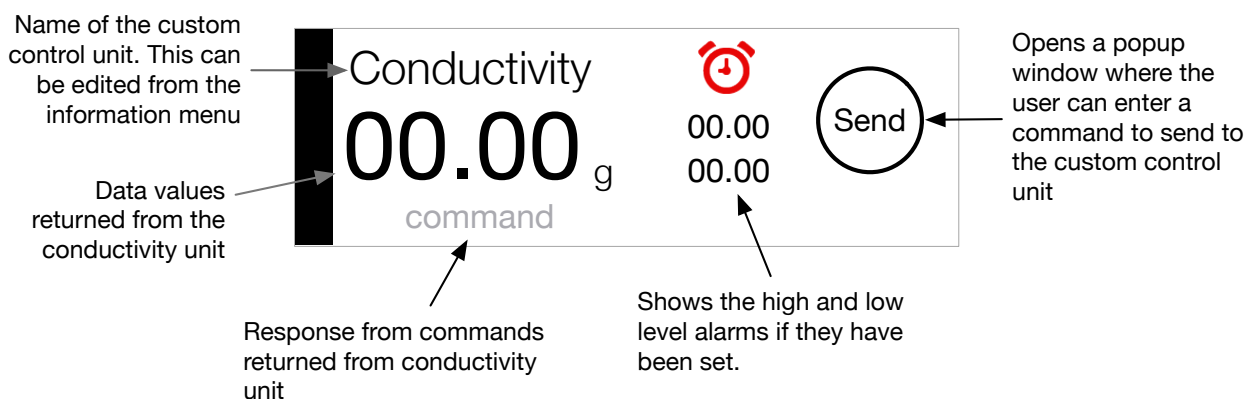
## Responses:

Response	Description
ERR1	The command sent was not valid due to first character
ERR2	The command sent was not valid due to second character
ERR3	CL, CH, T or K were successfully entered but ### was not a number
ERR4	A non-number character was reported from the sensor. Possible causes include readings off the sensors range. Ensure that the sensor has been properly calibrated for your range, and your probe has a suitable K value.
ERR5	A command was not completed properly. Try again, if the error repeats reboot the unit. If this fails contact the support desk.
ERR6	An invalid K value was received by the unit

NOTE: Errors will not be returned if you have entered valid numbers that are not the correct calibration values, temperatures or K values. Also, if you have performed a dry calibration on a wet probe, no error will be returned.

## DataWorks App:

When scanning for the custom control unit in the DataWorks App it should appear with the custom name "Conductivity". Once connected the instrument will appear as per the image below on the main screen.



## Calibration Procedure:

To ensure your values are accurate, it is recommended that a 3 point calibration is completed on a regular basis. The 3 point calibration include a dry calibration follow by a low-point and high point calibration.

To calibrate your meter:

1. Set the current temperature of your solution
2. Prior to starting a calibration procedure you can clear the existing calibration – however, this is optional.
3. Remove the electrode from any solution and ensure that it is completely dry.
4. Send the device the CD command – and you should see the C-OK response 1-2 seconds later
5. Now place the electrode into the low-point calibration solution. Wait until the conductivity reaches a steady value – which may take up to a minute.
6. Send the device the CL### command, where ### is the conductivity of your solution in microseimens. – you should see the C-OK response 1-2 seconds later.
7. Remove the electrode from the solution, pat dry and place in the high-point calibration solution.
8. Send the device the CH### command, where ### is the conductivity of your solution in microsiemens. – you should see the C-OK response 1-2 seconds later.
9. The calibration is now complete and you are ready to start taking samples.
10. You are now ready to measure. If you wish to perform a new calibration, clear previous calibration using function CC, and repeating from step 1.

We have provided a low conductivity solution of 12,880  $\mu\text{S}$  and a high conductivity solution of 80,000 $\mu\text{S}$ , and a probe with a K value of 1.0. This is good for a range of values from 50 $\mu\text{S}$  to 100,000 $\mu\text{S}$ . Solutions with conductivities outside this range will require different solutions

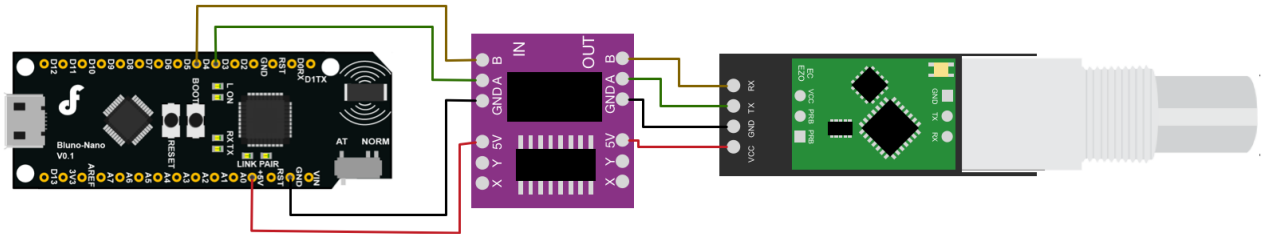
## Source Code:

The source code is available through a bitbucket repository. This is a public repository that is available to anyone. This code can be downloaded and modified and updated on the Bluno unit.

**Repository:** <https://bitbucket.org/instrumentworks/bluno-conductivity-sensor>

## Wiring Diagram:

The wiring diagram shows the contents of the custom control unit.



## Warranty:

This custom control unit include a 12-month replacement warranty. However, if the unit is opened, modified or reprogrammed, the warrant may be void.

## Revision History

Version	Date	Author(s)	Reason for Change
1.0	08/02/2016	Alex Porkovich	Initial release
1.1	18/02/2016	Shane Cox	Reviewed and updated
1.2	07/03/2016	Shane Cox	Updated recording cell image