# Schematic Notes for RS-485 All-in-one Probe

## U1:

This is the MCU which controls the integrated depth, temperature, and EC sensors. It is also responsible for sending and receiving messages over the RS-485 Bus.

U2:  
The three-state buffer is responsible for switching the USART RX input on U1 between the WKE/RX input and data from the RS-485 Converter.

## U3:

This is the line driver for the RS-485 Bus, it is linked to U1 via USART. Its read enable and write enable are also controlled by U1 pins PD4 and PD5 respectively. Behaviour of the RS-485 Bus is configurable in software. Including speeds, protocols, and device power mode behaviour.

#### Wiring Diagram:

|  |  |  |
| --- | --- | --- |
| Name | Cat-5 cable | Function |
| GND | Green | Ground |
| 3.3V | Orange | Supply voltage |
| RS-485 B | White/Blue | RS-485 B line |
| RS-485 A | Blue | RS-485 A line |
| RST/5V | White Orange | Sensor reset, optional 5V supply |
| WKE/RX | White Green | RX for sensor programming, optional dedicated device wake line |

## U1 Programming:

The ATmega328p can be programmed via the available interface. To do this this TX pin of the ATmega328p serial programmer is connected to an RS-485 line driver set to transmit over the bus. The RX pin of the ATmega328p serial programmer is connected to the WKE/RX pin, and the RST pin to RST/5V. The Arduino IDE can then be used to upload a new program to the ATmega328p.

## Power States:

The BoSL All-in-one Probe is designed to consume minimal power. Below two low power states are described.

In the lowest power mode U1, the ATmega328p is set to power down mode. RE is drawn high and DE is drawn low, this puts U3 into standby mode. This mode can only be awoken via a low level on the WKE pin.

In the next power mode U1, is set to power down, however both RE and DE are drawn low. This enables the receiver on U3 and allows the sensor to wake up over an RS-485 issued command. This power mode draws an additional 1 mA.