



## Fathom-X Documentation

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## Introduction

The *Fathom-X* Tether Interface Boards provide a high-speed, long-distance Ethernet connection to an ROV or other remote platform. They're designed for use with the [Fathom tether](#), standard Cat5 cable, or even a single twisted pair of wires. This board uses the [Rak Wireless LX200V20 module](#), which leverages the robust HomePlug AV (IEEE-1901) standard for sending Ethernet through powerlines.

The *Fathom-X* board is also part of the *Advanced ROV Electronics Package* and works well in conjunction with the Raspberry Pi, Pixhawk, and [ArduSub Control Software](#).

## Features

- 80 Mbps Ethernet over two wires (per our own bandwidth testing)
- 300m+ tether length capability (published capability of 2000m)
- Plug-and-play with no setup involved
- Onboard switching power supply with 7-28V input range
- USB Mini-B connector for powering directly from a computer on the topside
- Indicator LEDs for power, link, and data
- Included 6" Ethernet cable for connection to onboard computer

## Quick Start

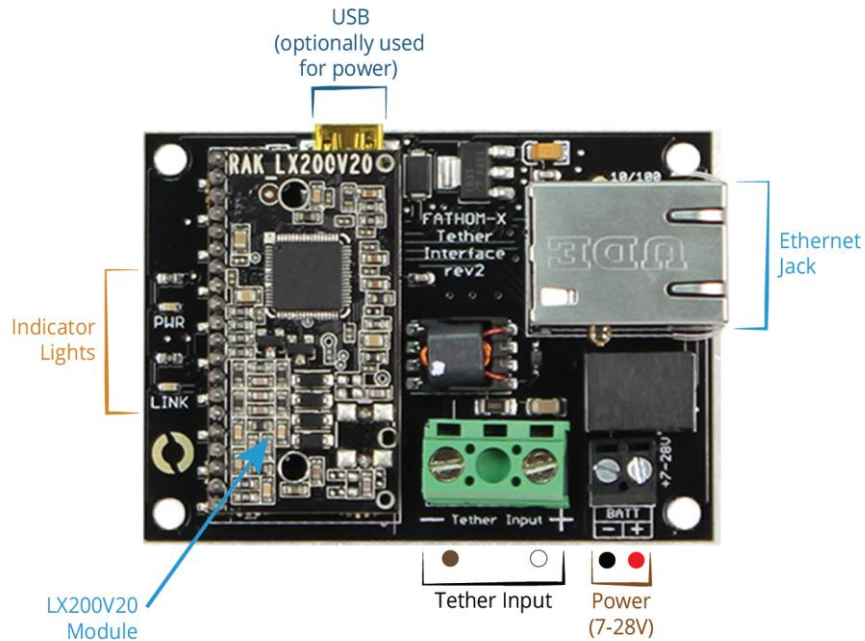
1. Connect two wires from the tether cable to the terminal block
2. Power each board with either a USB connection or a 7-28V input to the small terminal block
3. Connect an Ethernet cable and the connection should become active immediately

## Specifications

### Function Diagram



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### Specification Table

Item	Condition	Value
<b>Electrical</b>		
Supply Voltage	Terminal Block	7-28 volts
Supply Voltage	USB	5 volts
Max Power Draw	—	2.5 Watts
<b>Performance</b>		
Max Practical Bandwidth		80 Mbps
Physical Layer Bandwidth		200 Mbps
Working Frequency		2-30 MHz
Max Tether Length (Published)		2000 m
Max Tether Length (Tested)		300 m
<b>Physical</b>		
Operating Temperature		-20 to +85°C

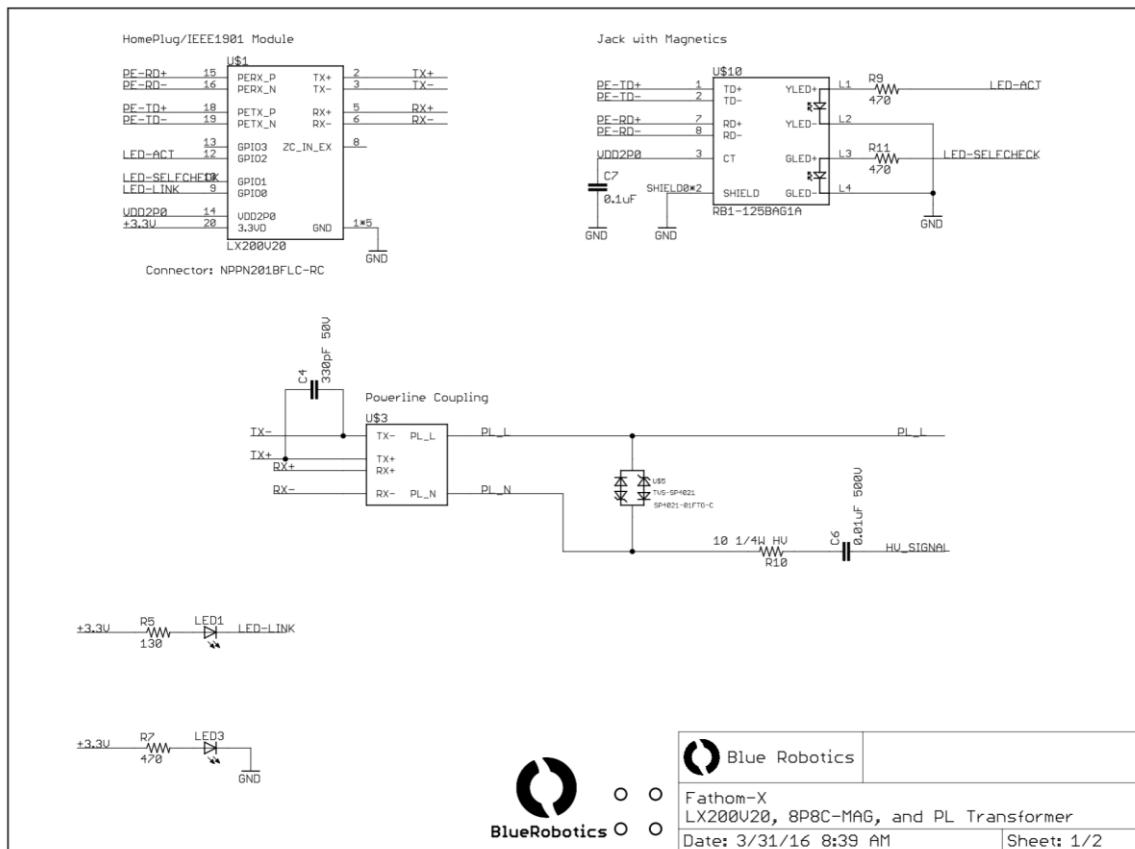


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Item	Condition	Value
Storage Temperature		-40 to +85°C
USB Connector Type		USB Mini B Female
Tether Wire Gauge		12-30 AWG
Power Wire Gauge		16-26 AWG
Dimensions		64 x 46 mm
Screw Hole Spacing		57 x 40 mm
Screw Hole Diameter		3.3 mm

## Schematic

The [EagleCAD files](#) for the schematic and board are available on our [GitHub page](#).



## Installation

### Normal Scenario



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In most cases, the Fathom-X setup is simple. Once powered, it acts as a transparent Ethernet bridge to extend any Ethernet connection through the tether.

The four screw holes are identical to those on the Fathom-S ROV board, so they can be interchanged quickly.

### With Fathom-S

The Fathom-X board can be use with the Fathom-S board to provide the features of both, simultaneously. Additionally, the screw hole pattern is identical so that they can be stacked together with stand-offs.

The use both board together:

1. Connect the tether wires to the Fathom-S board normally.
2. Add jumpers between "Pair 4" on the Fathom-S board and the large terminal block on Fathom-X. Connect 4+ to "+" on the terminal block and 4- to "-" on the terminal block.
3. That's it, both boards will function normally, including the power on/off feature of the Fathom-S board.