User Manual

OTPS1KW-ASM-ROV-R1/ OTPS1KW-ASM-TOPSIDE-R2

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Contents

Safety at a Glance

1. **Environmental Considerations**
   - The power supply console is not IP rated for water or dust ingress. Be aware of the working conditions. Do not operate in rain and protect console from spray.
   - The connector on the tether is only IP rated when mated. Replace cap when storing in box with wet tether.
2. **Operation**
   - Test the Ground Fault Interrupter (GFI) prior to use. If the GFI fails return for service.
   - Do not close the lid of the power supply or block fan inlets and outlets during operation. The unit requires air flow for proper cooling.
   - The power supply allows for continuous operation of the vehicle. Limit amount of time at full throttle to avoid potential overheating of motor drive components.
3. **Maintenance and Upkeep**
   - Do not use cracked, cut, or damaged tether. **Discontinue use and replace if damaged**.
   - Inspect connectors and penetrations for any signs of wear or damage prior to use.
   - Always grease wet mate connectors prior to use.
   - There are no user serviceable parts in the OTPS1KW-ASM-ROV-R1 or OTPS1KW-ASM-TOPSIDE-R2 except for the user access area. Do not attempt to open either the OTPS1KW-ASM-ROV-R1 or OTPS1KW-ASM-TOPSIDE-R2.

Legend


Warning/ Caution


High Voltage

Safety

Warning

The OTPS1KW-ASM-ROV-R1 system is supplied with $400V_{DC}$. Improper use may result in electrical shock or electrocution. Only trained and experienced personnel should operate the equipment.

Warning

The OTPS1KW-ASM-TOPSIDE-R2 system is supplied with $100\text{-}240V_{AC}$ and supplies $400V_{DC}$. Improper use may result in electrical shock or electrocution. Only trained and experienced personnel should operate the equipment.

Warning

Troubleshooting described in this manual is to be done only by qualified service personnel. To avoid electrical shock or equipment damage, do not troubleshoot or service any components unless you are qualified to do so.

Caution

NEVER PLUG OR UNPLUG ELECTRONICS WITH POWER ON! Damage or personal injury may result.

System Overview

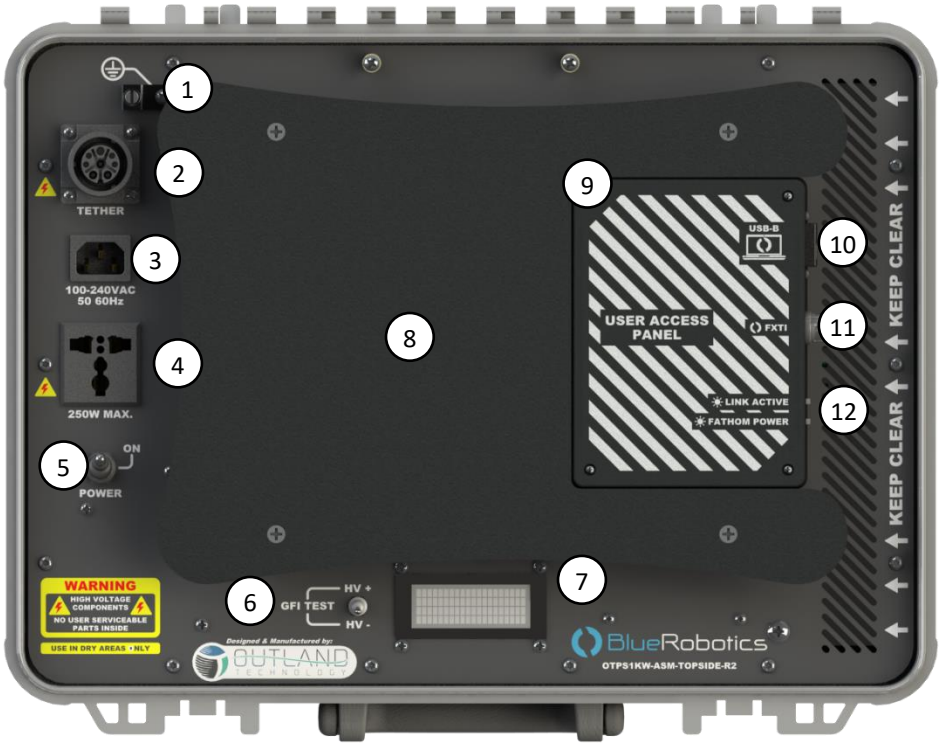
The battery replacement system package is a drop-in replacement for the BlueROV2 battery watertight enclosure. The battery replacement system is comprised of three parts: the OTPS1KW-ASM-TOPSIDE-R2, OTPS1KW-ASM-ROV-R1, and tether. The OTPS1KW-ASM-ROV-R1 ROV enclosure easily replaces the Battery Enclosure utilizing the same dimensions and mounting. The OTPS1KW-ASM-ROV-R1 utilizes wet mate connectors allowing the tether to be removed. The enclosure provides 1000W @ 15V to the vehicle and as well as data pass through. Connections to the BlueROV2 Electronics Enclosure are maintained utilizing Blue Robotics penetrators. Power connection uses the standard 3.5mm bullet connector and 0.1" (2.54mm) crimp connector for Fathom-X communications and spare twisted wire pair. The tether is comprised of two twisted pairs for data and 3 pairs for power. The power conductors allow for operation out to 300m. The top side power supply, OTPS1KW-ASM-TOPSIDE-R2, provides 400VDC to the OTPS1KW-ASM-ROV-R1. The supply incorporates a GFI for user safety, and status indicator which reports power supply output voltage, current and run time.

Power Supply Unit: OTPS1KW-ASM-TOPSIDE-R2

Specifications

Input Voltage: 100-240VAC 50/60Hz
Input Current$_{(MAX)}$: 15A
Input Power$_{(MAX)}$: 1800W
Output Voltage: 400VDC
Output Current$_{(MAX)}$: 4A

Output Power$_{(MAX)}$: 1600W
Efficiency$_{(NOM)}$: 90.5%
Operating Temperature: -30°C to +50°C
Humidity: 10-95% RH non-condensing
IP rating: IP20



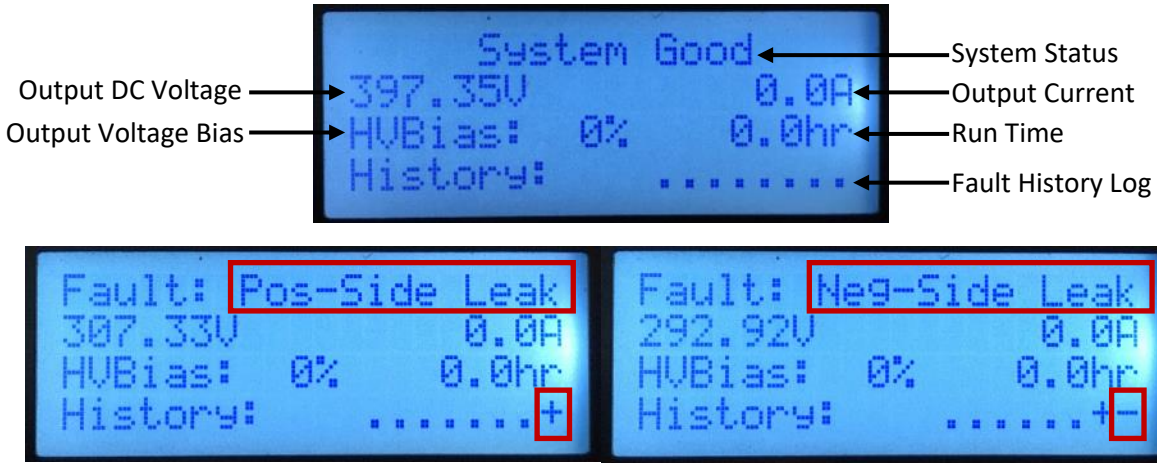
1. Green wire GND
2. Tether Connection
3. Input Power (Uses IEC 320-C13 connector)
4. Laptop Power Outlet
5. Power Switch
6. GFI Test Switch
7. System Status Display
8. Laptop Tray
9. User Access Panel
10. USB FXTI Conn.
11. External FXTI Conn.
12. FXTI Link and Power Indicators

ROV Power Supply Bottle: OTPS1KW-ASM-ROV-R1

Specifications

Output Voltage$_{(NOM)}$: 15VDC
Output Current$_{(MAX)}$: 66.8A
Output Power$_{(MAX)}$: 1000W
Efficiency$_{(NOM)}$: 92%

System Status Display



- System Status: Indicates Current System Status: “Good” or “Fault”.
- Output DC Voltage: Voltage supplied to tether. Measured at topside power supply output.
- Output Current: Tether cable current.
- Output Voltage Bias: Indicates leakage current from high voltage positive to chassis ground and high voltage negative to chassis ground. **HVBias** >2% indicates potential water leak on the high voltage between power supply and OTPS1KW-ASM-ROV-R1. See troubleshooting.
- Run Time: Cumulative run time of power supply console
- Fault History Log: Log of last 8 power cycles, newest results are on the right. A dot indicates normal operation, + indicates Pos-Side Leak, and – indicates Neg-Side Leak.

User Access Area

Within the laptop tray resides a user access area. This area is isolated from the internal high voltage and is available for users to mount custom interface electronics. The standard package is equipped with a Fathom-X interface board and ethernet to USB adapter. In addition, a Binder 770 connector is supplied with blue and orange data pairs connected. The Blue pair is connected in parallel with the internal Fathom-X interface board. The orange pair is available to the user as an additional connection.

Installation

The OTPS1KW-ASM-ROV-R1 bottle is delivered ready for install. Follow the standard procedure for the Blue ROV2 Assembly.

Outland Technology Power Supply BlueROV2 Integration Guide

Caution: Once the power cord is connected to an outlet, AC voltage is present in the console and at the Laptop charging outlet.

Note: Voltage applied to power supply is also present at the laptop port. Example: 220V input will result in 220V at laptop charging port.

Quick Start Guide

1. Ensure the power connection has a good ground.
2. Connect supplied Green Wire to earth ground for added protection. Refer to OTPS1KW-ASM-TOPSIDE-R2 image above for mounting location.
3. Inspect tether and bottle connectors for damage and lubricate with waterproof silicone grease. Grease procedure: Subconn Handling Instructions
4. Connect tether to OTPS1KW-ASM-ROV-R1 and OTPS1KW-ASM-TOPSIDE-R2. Be mindful of the of the connector mating position when connecting.
5. Test GFI
    a. Disconnect tether from power supply.
    b. Turn on Power.

Caution: Once the power is switched on, High Voltage is present on the tether output.

    c. Move GFI Test switch to HV+. Power supply will shut off. Fans will stop and LCD will indicate fault to HV+ side, if not see subsection 6F.
    d. Cycle power to unit by turning main power switch to Off and then back On.
    e. Move GFI Test switch to HV-. Power supply will shut off. Fans will stop and LCD will indicate fault to HV- side, if not see subsection 6F.
    f. If either test fails, stop all operation and disconnect main power, see troubleshooting guide.
6. Turn off power
7. Connect tether to power supply
8. Connect USB data connection to computer. Follow the Blue Robotics Network Setup instructions for proper setup.
9. Power unit and run standard preflight checks.

Caution: Once the power is switched on, High Voltage is present on the tether output. If vehicle is connected to tether it will also be powered at this time, stay clear of all propellers. Do not connect or disconnect tether with the power supply turned on.

10. Commence mission.

Troubleshooting

1. HV bias > ±2% indicated on System Status Display, Vehicle still operational.
    - The Vehicle will continue to operate but the High Voltage leak needs investigated.

- Turn Off system power, disconnect ROV tether from the OTPS1KW-ASM-TOPSIDE-R2. Turn On system power and observe the HV bias reading. If reading anything over ±2%, there is an issue with the power supply. Return for repair.
- If the HV Bias is <±2% with tether disconnected, turn Off system power and reconnect tether to the OTPS1KW-ASM-TOPSIDE-R2. Disconnect the tether from the vehicle, and attach 3pin male and 8 pin male dummy plugs to the ROV end of the tether. Submerge as much of the tether as possible, turn On power and observe the HV Bias reading. If >±2% return tether for repair. If a spare tether is available, repeat test with second tether.
- If HV Bias is <±2% with dummy plugged tether, power down unit and reconnect to vehicle. Turn on power and observe the HV bias reading. If HV Bias >±2% return OTPS1KW-ASM-ROV-R1 for repair.

2. HV Bias Trips GFI

   Repeat steps from bias condition above and return faulty components for repair.

3. Depth Sensor Dropouts and Erratic Reading/HUD Errors
   - The high voltage step-down power supply can add additional noise into the system due to high voltage switching. In addition, the nature of I2C communications make it susceptible to this noise. The solution is to implement common mode noise suppression by adding a ferrite to the I2C connection from the depth sensor to the Pixhawk. The standard-length depth senor cable only allows for single pass. Therefore, it is recommended to add two ferrites cores.
   - Installation:
     - Disconnect the I2C Depth Sensor wire from the Pixhawk
     - Feed the I2C wire through two ferrite cores
     - Position one ferrite near the Pixhawk and position the other near the depth sensor
     - Secure in place using cable tie, heat shrink, etc.
     - Reconnect the I2C depth sensor wire to the Pixhawk I2C port
   - Recommended part: Laird-Signal Integrity Products LFB143064-000

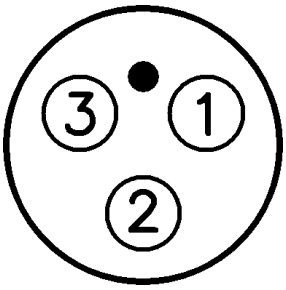
Electrical Interface

OTPS1KW-ASM-ROV-R1 Enclosure Connections

Input Power Connection

Connector: Subconn/Seacon MC-BH-3-M

Pin	Signal	Function	Description
1	HV +	Power	+200 VDC
2	HV -	Power	- 200 VDC
3	Chassis	Power	Chassis Ground

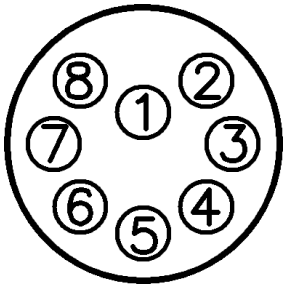


MC-BH-3-M
Face View

Input Data Connection

Connector: Subconn/Seacon MC-BH-8-M

Pin	Signal	Wire Color	Description
1	Spare	Orange	Spare twisted pair
2	Spare	Orange/White	



3 4	N.C. on tether [1] N.C. on tether	Green Green/White	Spare twisted pair
5 6	N.C. on tether N.C. on tether	Brown Brown/White	Spare twisted pair
7 8	Fathom-X - Fathom-X +	Blue Blue/White	Fathom-X pair

Output Low Voltage Connection to BlueRov2

MC-BH-8-M
Face View

Power Cable: 03-0161

Connector: 3.5mm Bullet, female

Pin	Signal	Function	Description
1	+15V	ROV Power	15V, 1000W supply, Red
2	GND	GND	Ground Input, Black

Data Pass through to BlueRov2

Data Cable: 03-0162

Connector: 4 x 3 Position 0.1" Crimp Connector with Housing, female (center pin not populated)

Pin	Signal	Wire Color	Description
1 2	Spare Spare	Orange Orange/White	Spare twisted pair
3 4	Spare Spare	Green Green/White	Spare twisted pair[2]
5 6	Spare Spare	Brown Brown/White	Spare twisted pair[2]
7 8	Fathom-X - Fathom-X +	Blue Blue/White	Fathom-X pair

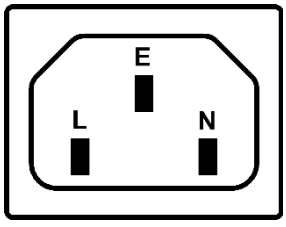
Note: All 4 pairs are wired up to the 8pin tether connector using a 1-1 connection by wire color.

OTPS1KW-ASM-TOPSIDE-R2 Power Supply Connections

Input Power

Connector: IEC 320-C13

Pin	Signal	Function	Description
1	Line	Power	AC Line
2	E	GND	Ground
3	Neutral	Power	AC Neutral

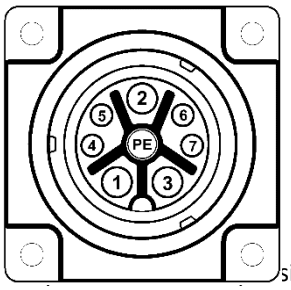


IEC 320-C13
Face View

Tether Connection

Connector: Binder 09-6504-000-08

Pin	Signal	Function	Description
1	HV+	Power	+200 VDC
2	N.C.	N.C.	No Connection
3	HV-	Power	-200 VDC
4	Fathom-X-	Signal	Fathom-X pair



Binder 09-6504-000-08
Face View

[1] N.C. = No Connect

[2] Green and Brown spare twisted pairs are connected in the OTPS1KW-ASM-ROV-R1 [illegible]sion.

Pin	Signal	Function	Description
5	Fathom-X+		
6 7	Spare- Spare+	Signal	Spare Twisted Pair
PE	Protective Earth	GND	Protective Earth GND

USB FXTI Connection

Connector: USB Type-B

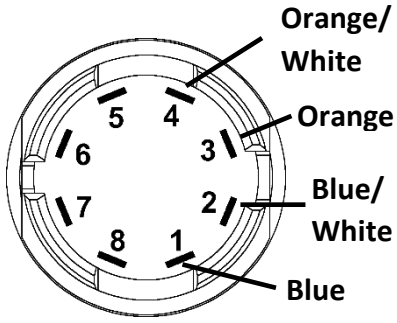
Standard USB pinout

Pin	Signal	Function	Description
1	VCC	Power	+5V
2	D-	Signal	Data -
3	D+	Signal	Data +
4	GND	GND	Ground

External FXTI Connection

Connector: Binder 770

Pin	Signal	Wire Color	Description
1 2	Fathom-X - Fathom-X +	Blue Blue/White	Fathom-X pair
3 4	Spare Spare	Orange Orange/White	Spare twisted pair[2]
5 6	N.C. N.C.	Green Green/White	No Connection
7 8	N.C. N.C.	Brown Brown/White	No Connection



Binder 09-6504-000-08
Back View

Tether Wiring