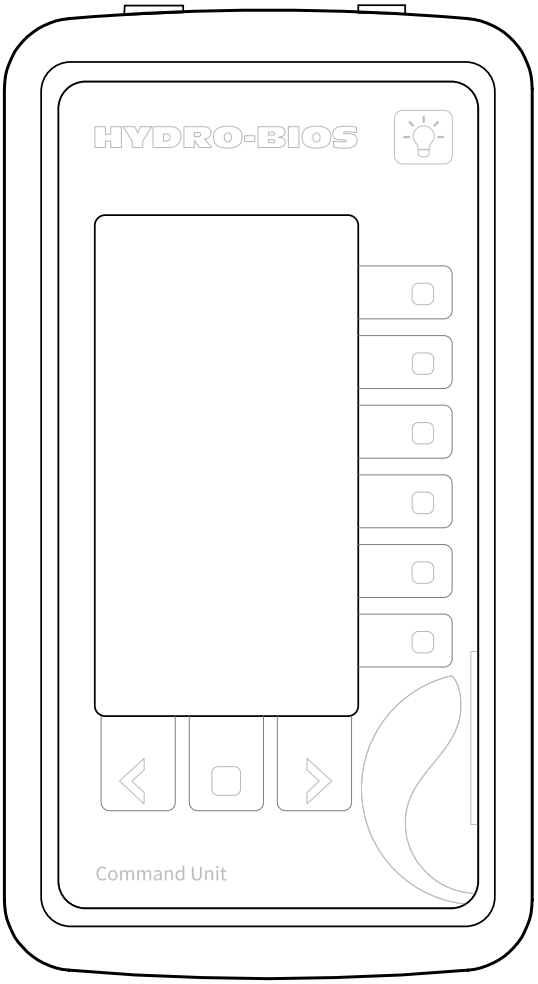


COMMAND UNIT

OPERATION MANUAL

Product ID 439 300

Edition 08/26

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SAFETY INSTRUCTIONS

NOTICE



Please read this manual carefully before operating or performing maintenance on the instrument. Pay special attention to all danger, warning and caution statements. Failure to do so could result in serious injury and/or damage to the instrument. Keep manual available at all times.

LAYOUT AND MEANING OF WARNINGS

All safety instructions found in this operation manual follow this pattern (signal words):

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.
NOTICE may also indicate a situation which, if not avoided, may cause damage to equipment.

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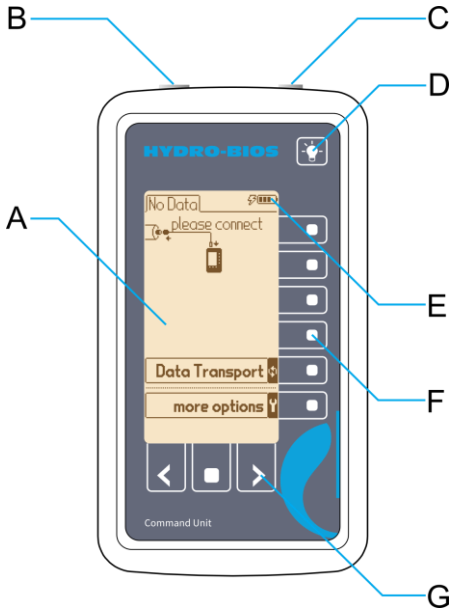
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GENERAL DESCRIPTION

The Command Unit is a portable user interface for compatible HYDRO-BIOS instruments with *generation 5 electronics*. It can be used to view live sensor and status data, access the instrument's service and programming functions as well as to retrieve mission files after deployment. With its internal battery and low power, sunlight readable LC-Display it offers a rugged and portable alternative to connecting a PC directly to the instrument.

Communication is possible via full speed serial cable as well as via long distance telemetry. The Command Unit can also connect to a PC over USB and act as a USB interface to telemetry signal bridge.

Operation and user interface details will depend on the instrument that it is connected to – therefore this document assumes that the user has read the operation manual of the instrument to be connected to the Command Unit first.



A. LCD-Screen
backlit and sunlight readable

B. instrument **connector**
cable connection to HYDRO-BIOS instrument

C. USB Connector
Use supplied USB cable to connect to OceanLab PC-software. Charging also occurs over this connector.

D. on-/off and display backlight switch
Turn the Command Unit on with this switch. While on, a short press will enable/disable the backlight and a long press will turn off the unit.
A *light bulb icon* in the top right of the display indicates that the display backlight is on. This way the user can notice a switched on backlight even in bright outside conditions and turn it off to save battery power.

E. battery charge indicator
A *flash icon* indicates that the Command Unit battery is being charged.

F. vertical soft buttons
An on-screen symbol and text will indicate that the button can be pressed in the current context.

G. horizontal soft buttons
An on-screen symbol and text will indicate that the button can be pressed in the current context. Typically used for flipping through pages or navigating menus.

STANDARD EQUIPMENT

1. 1 Command Unit
2. 1 Elastic case protector
3. 1 protecting cap for each LEMO connector
4. 1 Command Unit serial cable to PC: Lemo - 2 m – USB
5. 1 Spare fuse (125V~, 125mA, Littelfuse 154.125) for long distance telemetry protection
6. 1 Operation manual

TECHNICAL DATA

Environmental:	
Operating temperature:	-20 to 55°C
Storage temperature:	-30 to 60°C
Ingress protection:	IP65***
Battery:	
Operating time (no backlight):	50 to 100 hours
Operating time (backlight full brightness)*:	10 hours
USB charge current:	500 mA
Charge time:	2 to 3 hours
Charging temperature range**:	approximately 4° to 48°C
Life expectancy:	>80% after 2000 charge-discharge-cycles
Self-discharge:	typ. <3% per month
Physical (including case protector):	
Length:	171 mm
Width:	96 mm
Height:	45 mm
Weight:	350 g
Display:	
Resolution:	240*128 pixels
Type:	transflective LCD with LED backlight

** backlight will auto power-off after a few minutes to save battery power*

*** unit will not charge outside this range*

**** IP65 even without protective caps. Caps are intended for dusty / salt water environments.*

COMPATIBILITY

The Command Unit is compatible with the following instruments with generation 5 electronics:

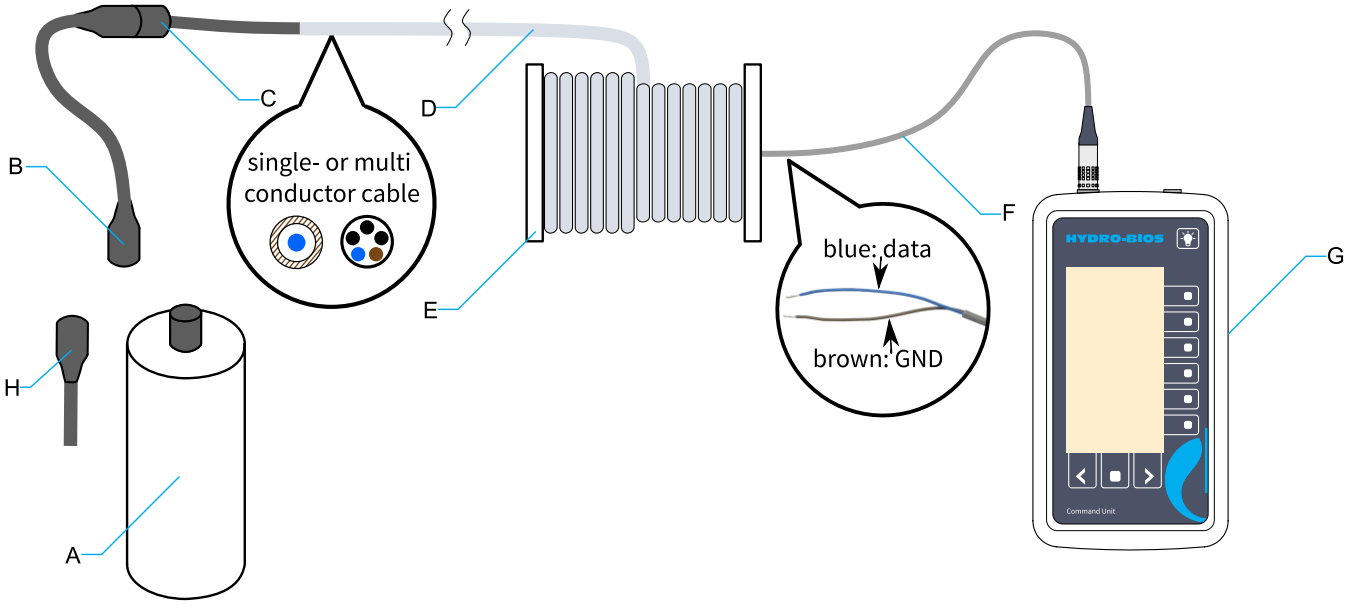
- MultiNet
- Multi Water Sampler
- Depth Meter
- Net Probe
- Single Fire Module
- Twin Fire Module
- Multi Sediment Trap
- Multi Limnos

The Command Unit firmware can be client side upgraded to remain compatible with future instrument functionality.

ESTABLISHING A CONNECTION

LONG DISTANCE TELEMETRY CONNECTION TO THE INSTRUMENT

The two wire telemetry connection is typically used to display online measurement data and control the instrument with the Command Unit and optionally with a PC, while the instrument is under water. A typical setup looks like this:



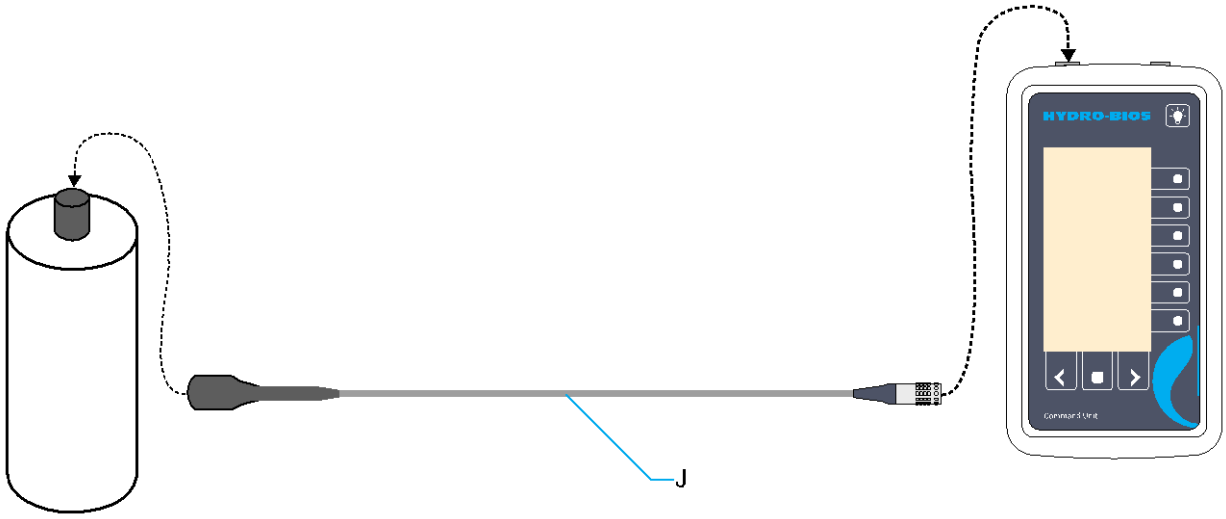
A. instrument
B. adaptor cable
C. pig tail
D. electromechanical winch cable
E. winch
F. slip ring box cable
G. Command Unit
H. dummy connector

Note on long distance telemetry connection:

HYDRO-BIOS instruments which support long distance telemetry are usually connected using both HYDRO-BIOS breakout plugs as well as customer equipment (e.g. a winch). The telemetry signal is transmitted over two wires which need to be connected in the correct polarity for the connection to work. Wrong polarity will not damage the Command Unit or the instrument but will not work. See section “MAINTENANCE” and “Localization of faults” for more information.

Avoid prolonged exposure to direct sunlight. When exposed to dust or salt water, rinse with fresh water and leave to dry. This is specifically valid for the receptacles.

FULL SPEED SHORT DISTANCE SERIAL CONNECTION TO THE INSTRUMENT



J. full speed serial cable: 5-pin subconn plug to 4-pin lemo

This type of connection is used for deployment preparation, test operation and connection and for data retrieval after offline missions.

- Plug in the full speed serial cable to both the Command Unit and the instrument.
- Make sure the instrument is powered (charged battery connected).
- Switch on the Command Unit and the instrument.

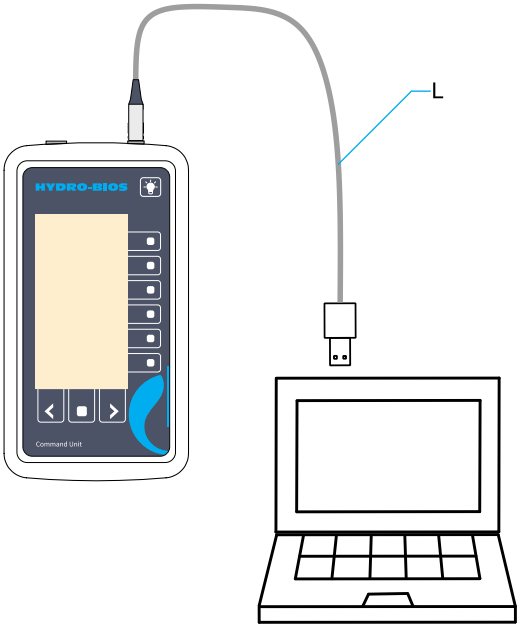
  Instruments without a main switch will automatically be woken up by the Command Unit.
- Command Unit shows a list of installed components and sensors on the instrument.

USB CONNECTION TO PC

- Plug in USB cable to both the Command Unit and the PC.
- Start OceanLab software (version 4 or later required).
- Press the **Connect** button in OceanLab.

  If an instrument is connected to the Command Unit the sensors and components in the instrument will now appear in the OceanLab window.

  If there is no instrument connected to the Command Unit OceanLab will display **Underwater unit: no data**. The user can now activate the data transport mode on the Command Unit screen. See section “Data Transport Mode”.



L. Command Unit USB cable to PC

DATA TRANSPORT MODE

For cases where data is to be exchanged between the HYDRO-BIOS instrument and the PC but a direct connection is impractical the Command Unit can be set to data transport mode. In this mode it is used as a mobile storage medium to carry data between the PC and the instrument without a direct connection.

The following data can be exchanged this way:

- real time clock setting (PC -> instrument)
- pressure or time programming (PC -> instrument)
- offline files (instrument -> PC)

Note: Data transport mode only works over the full speed serial cable. It does NOT work via long distance telemetry.

TYPICAL USAGE SCENARIO

Depth programming the large heavy instrument on the ships deck while the PC is in a dry room. In that case usage would for example look like this:

- Connect the PC running OceanLab to the Command Unit.
- Enable the **Data transport** mode.
- Program real time clock and pressure settings.
- The Command Unit displays one check mark behind the icons for clock and pressure settings. ✓
- Disconnect the cable.
- Walk on deck and connect the Command Unit to the sampler.
- Switch on the motor unit.
- Switch on the Command Unit (if it has been switched off in the interim).

  Programming will now automatically be transferred to the sampler (Command Unit displays two check marks ✓✓).
- Disconnect the Command Unit and deploy the sampler.
- After the mission: reconnect the Command Unit in data transport mode.
- Offline data files generated on the sampler will now be synched to the Command Unit. In the meantime there is a progress bar. Wait until the Command Unit displays **Files synched**.
- Walk to the PC and connect the Command Unit to OceanLab.
- Save and view the offline data files.

ACTIVATING DATA TRANSPORT MODE

1. Press the soft button labeled **Data transport** on the Command Unit.
   (Visible only if no instrument is connected).
2. Connect instrument to automatically start synching files.
   - or -
3. Connect to a PC running OceanLab to transfer programming and real time clock settings.

When already connected to an instrument with a memory component, the data transport mode can also be activated by pressing the **Synchronise** soft button in the memory components' menu.

MAINTENANCE

Avoid prolonged exposure to direct sunlight.

When exposed to dust or salt water, rinse with fresh water and leave to dry. This is specifically valid for the receptacles.

LOCALIZATION OF FAULTS

TELEMETRY CONNECTION STOPS WORKING AS SOON AS THE DEVICE IS IN THE WATER

The telemetry data connection works fine on deck but stops working as soon as the device is submerged / dipped far enough into the water? You likely have a single conductor cable and are using the armour as the second conductor with both the slip ring connectors and the underwater cable connected with reversed polarity. **Solution: Reverse the polarity at both ends then double check that the brown wire from the command unit goes to the armour.**

TROUBLESHOOTING THE TELEMETRY CONNECTION

In order for the connection to work the following conditions must be met:

- The instrument is switched on (if applicable) and powered by a sufficiently charged battery.
- The "GND" and "telemetry signal" pins on the Command Unit (Lemo connector) are connected to their resp. counterparts on the instrument connector:
    - Without shorts or open circuits in any of the cables.
      Shorts on the telemetry interface won't damage the equipment but will impede the connection.
    - With the correct polarity.
- If the winch cable armour is used as one of the conductors, the GND pin should be connected to the armour (as opposed to the telemetry signal pin) - otherwise the signal may be shortened when the instrument is in water.
  Reason: the GND pin is electrically connected to the chassis of the instrument.
- The internal fuses of both the Command Unit and the instrument must be intact.
  Note: The fuses may be blown if they were exposed to third party equipment that outputs high voltages (>>5 V). The fuses cannot be blown by shorting the telemetry signal and ground pins.

The following **procedure** can help finding the cause of a telemetry connection issue. The assumption of this procedure is that the Command Unit and the instrument is currently connected over the long distance telemetry cable including the winch using winch adaptor cables at both ends.

Initial Tests

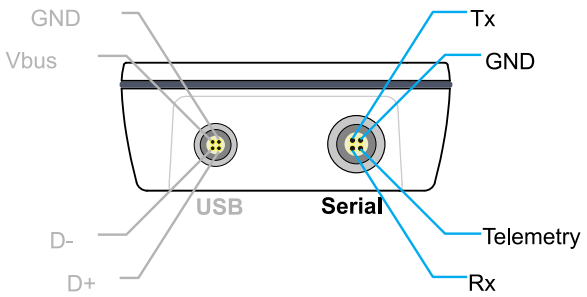
1. Make sure the instrument is switched on and has a sufficiently charged battery.
2. Unplug the telemetry cables from the Command Unit and from the instrument.
3. Establish a direct connection between the Command Unit and the instrument by plugging in the full speed serial cable (labeled J, ~2 m long).
   This cable has both the full speed serial pins and the telemetry pins connected.
4. Switch on the Command Unit.
5. Is the connection now possible?
    a. If so, a full speed serial connection has been established, meaning the power supply and the unit are working. Proceed with step 6.
    b. If a connection is still not possible, look for signs of damage on the full speed serial cable (J) and the connectors. If no damage can be found, go back to step 1 and double check the power supply.
6. On the Command Unit select **Telemetry test**, found under **Options**.
7. What does the test screen say?

a. **Connection OK?**
   The telemetry works fine over this cable, meaning the Command Unit and the instrument (including their fuses) are not faulty. Proceed with **inspecting the winch and winch adaptor cables**.
b. **Short circuit or wrong polarity?**
   This would only occur if the full speed serial cable is damaged. Look for signs of damage.
c. **Searching?**
   Proceed with **checking the fuses** in the Command Unit and the instrument.

Checking the Fuses

This step can be skipped if the direct connection over the full speed serial cable passed the **Telemetry test**.

1. Switch on the Command Unit.
2. Disconnect all cables.
3. Using a multimeter set to DC voltage, measure the voltage between pins 4 (GND) and 3 (telemetry signal) of the serial plug (the larger of the two).



4. Does the voltage read between 1.5 V and 1.8 V?
   a. Yes: the fuse in the Command Unit is fine. Proceed with checking the instrument fuse in step 5.
   b. No: Open the Command Unit case and check the fuse using a multimeter in continuity mode. Replace if necessary and **repeat the procedure from the beginning.**
      If communication between instrument and Command Unit can now be established you may skip points 5, 6 and 7.
5. Does the instrument have a main switch?
   a. Yes: Switch on the instrument.
   b. No: Activate it using the full speed serial cable (J) and the Command Unit soft button and unplug the cable from the instrument.
      Note: this makes sure the instrument stays on for the duration of this test.
6. Using a multimeter set to DC voltage, measure the voltage between pins GND and telemetry signal of the instrument's serial plug.
   Refer to the instrument*'s manual for the pin configuration.*
   Alternatively the minus probe of the multimeter (which has GND potential) could be held on to the flange, using the plus probe to successively check all the pins of the connector for voltages between 1.5 V to 1.8 V.
7. Does the voltage read between 1.5 V and 1.8 V (on one of the pins)?
   a. Yes: the fuse in the instrument is fine.
      At this point, the procedure did not yield any results. Contact Hydro-Bios.

b. No: The fuse is blown and has to be replaced. For replacement instructions contact Hydro-Bios.

Inspecting the winch and winch adaptor cables

- Unplug the full speed serial cable (J) and plug in all the telemetry connections (B through F).
- Does the instrument have a main switch?
    a. Yes: Switch on the instrument.
    b. No: Activate it using the Command Unit soft button.
    Note: this makes sure the instrument *stays on for the duration of this test.*
- Switch on the Command Unit and activate the **Telemetry test** mode.
- What does the Command Unit display?
    a. It reads **Short circuit or reverse polarity**:
        i. Reverse the polarity in the slip ring box.
        ii. Has the telemetry test now passed?
            - Yes: The fault has been identified and fixed.
            - No: It must be a short then. Restore the original polarity and continue.
        iii. Start unplugging the cable farthest from the Command Unit and work your way through all the cables until the short on the display disappears. The last cable unplugged has the short. **Fix the short and retest.**
        Alternatively, a multimeter can also be used.
    b. It reads **Searching**:
        i. Plug in only the slip ring box cable to the Command Unit and unplug its other end.
        ii. Apply a short to the open end.
        iii. Does the Command Unit display **short circuit or reverse polarity** now?
            - Yes: Continue to plug in the next cable and shortening it on the far end. The first cable that does not display a short is the one with the open circuit. **Fix the cable and retest.**
            - No: **fix the slip ring box cable open circuit and retest.**

NO DISPLAY ON COMMAND UNIT

Make sure the internal battery of the Command Unit has sufficient charge by connecting the USB cable.

MESSAGE “BATTERY ERROR”

There could be a problem with the internal battery. Contact HYDRO-BIOS for support.

MESSAGE “SHORT CIRCUIT” OR “REVERSE POLARITY”

See Chapter Troubleshooting the telemetry connection.

MESSAGE “INVALID DATA”

The Command Unit is not compatible with the connected instrument.

If this message is displayed even though the connected instrument is listed as compatible on page 6, the Command Unit or motor unit may need a firmware upgrade. Contact Hydro-Bios for support.

MESSAGE “WRONG INSTRUMENT”, EXPECTED ID[ ]

The Command Unit has been programmed (e.g. depth programming) with data for a different instrument. Connect to the correct instrument instead or exit the transport mode with the appropriate soft button.

OCEANLAB IS NOT DISPLAYING THE CORRECT INSTRUMENT TYPE / IDENTNO WHEN CONNECTED TO THE COMMAND UNIT IN TRANSPORT MODE

The Command Unit will remember the last instrument it has been connected to, including its programmed settings. This last instrument is the one it will present to OceanLab in data transport mode. If you want to transport programming to a different instrument, you first have to establish a connection to that instrument such that the Command Unit will remember it.

The Command Unit cannot remember more than the last instrument it has been connected to.

BACKLIGHT TURNS OFF AS SOON AS USB IS PLUGGED INTO PC / CHARGER

See section “Command Unit is not charging with my charger / wall wart” below.

OCEANLAB CANNOT FIND COMMAND UNIT EVEN THOUGH USB IS PLUGGED IN

See section “Command Unit is not charging with my charger / wall wart” below.

COMMAND UNIT HAS A BLINKING ICON NEXT TO THE BATTERY CHARGE INDICATOR

 See section “Command Unit is not charging with my charger / wall wart” below.

COMMAND UNIT IS NOT CHARGING WITH MY CHARGER / WALL WART

In the following scenarios:

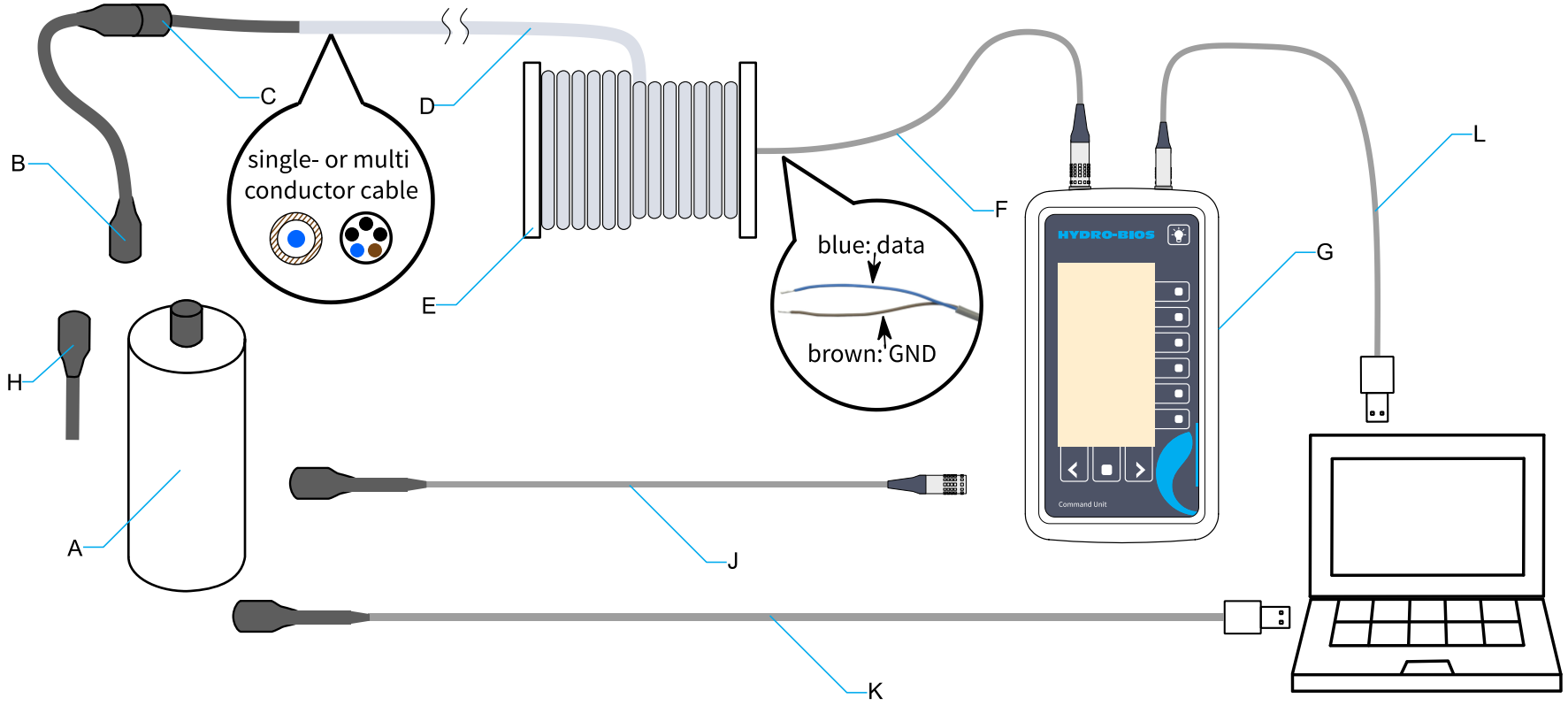
1. Command Unit is connected to a PC in Suspend Mode (Standby, Hybernate etc.).
   - or -
2. Command Unit is connected to a USB charger (wall wart) which does not identify as a charger.
   - or -
3. The USB cable / plug is faulty or has corroded/dirty contacts.
   - or -
4. The USB cable is not plugged in all the way (usually at the PC side).

The Command Unit will behave as follows:

- It will refuse to charge.
- The backlight is turned off.
- A blinking Icon will appear at the top right of the screen.
  

Try the following to resolve depending on the cause above:

1. Wake the PC.
2. Try a different charger (wall wart).
3. Inspect the cable for damage or bad contacts and make sure the USB cable is plugged in straight and all the way.
4. Try a different USB port on the PC.



A. probe / sampler

B. adaptor cable

C. pig tail

D. electromechanical winch cable

E. winch

F. slip ring box cable

G. Command Unit

H. dummy connector

J. full speed serial cable

K. PC to serial cable

L. Command Unit serial cable to PC

Fig. 1: connections overview.