A Load-Bearing Underwater Cable for Hand-Hauled, Real-Time Profiling

Profiling in real time, from small boats not equipped with a winch, calls for hand hauling a CTD using a load-bearing data cable. Sea-Bird can supply cables up to 300 meters (985 feet) in length that provide a practical way to hand-haul SBE 19 / 19plus / 19plus V2 SeaCAT Profilers or SBE 25 / 25plus Sealoggers CTDs, and acquire CTD profile data in real time. In these cases the CTD is powered by its battery, and the cable allows two-way* RS-232 communications (3 conductors - transmit, receive, and common) and bears the weight of the CTD.

The cable is not intended for static working loads above 45 kg (100 lbs); working loads above 18 kg (40 lbs) may be difficult to handle without a winch. The minimum recommended cable bend radius is 10 cm (4 inches) (e.g., 20 cm sheave block nominal diameter). Use with loads exceeding 45 kg (100 lbs) or cable bend radius less than 10 cm (4 inches) will reduce the cable’s useful life and void the warranty.

Attached drawings show the cable assembly and wiring details, and include tables of Sea-Bird part numbers for cables of specific lengths:

- Drawing No. 32284 –
  Standard connector to the CTD and 9-pin connector to the computer

- Drawing No. 32643 –
  Wet-pluggable connector to the CTD and 9-pin connector to the computer

- Drawing 32821 –
  Standard connector to the CTD and 4-pin connector to a SeaCAT / Sealogger RS-232 & Navigation Interface Box (Interface Box PN 90488 or PN 90545)

If the length needed is not listed on the drawing, contact Sea-Bird with the drawing number and desired length (300 meter [985 feet] maximum).

* Notes:
- Communications from the CTD to a computer - An SBE 19, 19plus, 19plus V2, 25, or 25plus CTD reliably transmits data over 300 meters (985 feet) of cable to a computer. See the applicable CTD manual for baud rate and real-time output rate limitations.
- Communications from a computer to the CTD for instrument setup, data upload, etc. are dependent on the computer serial port hardware and software settings, but are usually reliable over cables up to 300 meters long at low baud rates. Some laptop computers may have inferior serial port hardware, limiting the cable length over which they can transmit. If a computer cannot transmit over a long cable, disconnect the CTD from the long cable and connect to the computer using the shorter I/O cable provided with the CTD.
Using Load-Bearing Cable for Real-Time Data Acquisition with Seasave

1. Communicate with the CTD via the terminal program* to set up sampling parameters, initialize memory, etc. (see terminal program Help Files).
2. Configure Seasave for real-time acquisition and display (see Seasave Help files).
3. Start the CTD sampling via magnetic switch (or with computer command in the terminal program* per CTD manual instructions).
4. Deploy the CTD to begin profile.
5. Recover the CTD.
6. Stop the CTD sampling via magnetic switch (or with computer command in the terminal program*).
7. Communicate with the CTD via the terminal program* to upload data.

*Note: Sea-Bird has several terminal programs for communicating with instruments -
- SBE 19, 19plus, and 25: use Seaterm terminal program
- SBE 19plus V2 and 25plus: use SeatermV2 terminal program

Cable Specifications

- Nominal O.D. 7 mm (0.270 in.)
- Twisted trio of 22 awg conductors
- Pressure-extruded polyurethane jacket, dull, non-slip finish
- Weight in air approximately 50 grams/meter (0.034 lbs/ft)
- Weight in water approximately 4 grams/meter (0.0027 lbs/ft)
- PMG-4FS connector with locking sleeve to CTD and DB-9 serial data connector to computer - Drawing 32284
- MCIL-4FS wet-pluggable connector with locking sleeve to CTD and DB-9 serial data connector to computer - Drawing 32643
- PMG-4FS connector with locking sleeve to CTD and MS3106A-14S-2P connector to Seacat/Sealogger RS-232 & Navigation Interface Box - Drawing 32821
- Mechanical terminations are Chinese finger trap type, made from hollow-core, polypropylene rope with stainless thimbles
- Internal Kevlar braid with 180 kg (400 lb) breaking strength
- Maximum recommended working load 45 kg (100 lbs)
- Minimum recommended cable bend radius 10 cm (4 inches) (e.g., a 20-cm sheave block nominal diameter)
BRAID AND EYE INSTALLATION

1. Bring cable through braid
2. 1/2" dia. Heatshrink adhesive tubing 3", PN 31568
3. Install connector after installing braided splices

P1 PMG-4FS

<table>
<thead>
<tr>
<th>PIN 1</th>
<th>WHITE</th>
<th>ALT COLOR</th>
<th>P2 DB-9S</th>
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<tr>
<td>PIN 2</td>
<td>WHITE/BLACK</td>
<td>BLACK</td>
<td>PIN 3</td>
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<tr>
<td>PIN 3</td>
<td>WHITE/RED</td>
<td>RED</td>
<td>PIN 2</td>
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<tr>
<td>PIN 4</td>
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DIM A

DIM B

DIM C

SBE PN 801676, Eye Splice Assembly (2 each)

PMG-4FS w/ LOCKING SLEEVE G-FL5-P

SBE PN 171285, Pigtail per dwg 32275

CABLE TYPE: FALMAT

PM2069906A REV. B
POLYURETHANE, KEVLAR REINFORCED, 3 CONDUCTOR, 22 AWG.
YELLOW JACKET, NOMINAL O.D. = 0.270 IN.
100 LBS. WORKING LOAD (45 KG)
4 INCH MINIMUM BEND RADIUS (10 CM)
CABLE TYPE: FALLNT
SBE PN 171285, Pigtales per dwg 32642
FMD209999SA1 REV. B
POLYURETHANE, KEVLAR REINFORCED, 3 CONDUCTOR, 22 AWG.
YELLOW JACKET, NOMINAL O.D. = 0.270 IN.
100 LBS WORKING LOAD (45 KG)
4 INCH MINIMUM BEND RADIUS (10 cm)

BRAID AND LIFT-EYE INSTALLATION
1. Bring cable through braid
2. 20 +/- 2 inches behind eye
3. 1/2" dia. heat-shrink adhesive tubing 3", PN 31568
4. Install connector after installing braided splices
### Application Note Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>2000</td>
<td>Initial release.</td>
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<tr>
<td>March 2002</td>
<td></td>
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<tr>
<td>August 2002</td>
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<td>October 2002</td>
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<tr>
<td>September 2006</td>
<td>• Increase minimum cable bend radius to 4 inches.</td>
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<td>• Clarify that warranty voided if minimum cable bend radius is not met.</td>
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<tr>
<td></td>
<td>• Make cable limitations (maximum working load, minimum bend radius) more prominent.</td>
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<td>• Update drawing revisions.</td>
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<tr>
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<td>• Add cable for connection to Seacat/Sealogger Interface Box.</td>
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<tr>
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<td>• Provide wet-pluggable connector option for all instruments.</td>
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<tr>
<td>March 2008</td>
<td>• Update for 19plus V2.</td>
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<tr>
<td></td>
<td>• Reference SCPlusV2_RS232 terminal program as well as Seaterm.</td>
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<tr>
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<td>• Update part number of DC Interface Box.</td>
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<tr>
<td>February 2010</td>
<td>• Update for SeatermV2.</td>
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<tr>
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<td>• Update references to shorter cable that ships with CTD (PNs were no longer correct).</td>
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<tr>
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<td>• Update drawings that are part of application note (DN 32284, 32643, 32821).</td>
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<td>• Update address.</td>
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<tr>
<td>October 2012</td>
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