



APPLICATION NOTE NO. 59

revised **October 2012**

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 / 19*plus* / 19*plus* V2 SeaCAT Profilers or SBE 25 / 25*plus* 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, 19*plus*, 19*plus* V2, 25, or 25*plus* 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, 19*plus*, and 25: use Seaterm terminal program
- SBE 19*plus* V2 and 25*plus*: use SeatermV2 terminal program

Cable Specifications

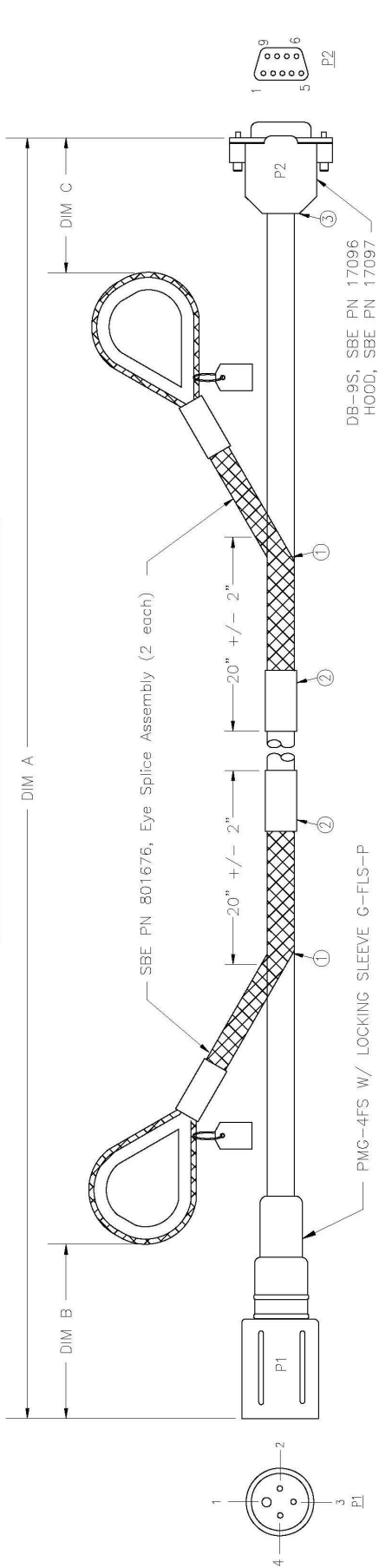
- Nominal O.D. 7 mm (0.270 in.)
- Twisted trio of 22 awg conductors
- Pressure-extruded polyurethane jacket, dull, non-slip finish
- Weight in air approximately 50 grams/meter (0.034 lbs/ft)
- Weight in water approximately 4 grams/meter (0.0027 lbs/ft)
- PMG-4FS connector with locking sleeve to CTD and 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/Seallogger 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)**



DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
3.02	A	Redrawn on new template		LRG	
06.02	B	Add 17097, Step 5	CB	KLP	MJ
08.02	C	See EGN 726	DB	MJ	CB
9.23.02	D	ADD. QTY & LENGTH	CB	KLP	
10.11.02	E	CHANGED BREAK STRENGTH	CB	KLP	
7.17.06	F	ECN 971, ALT WIRE COLOR	CB	CB	
9.6.2006	G	ECN 991 - Process Change	CB	MJ	

P1 PMG-4FS	COLOR	ALT. COLOR	P2 DB-9S
PIN 1	WHITE	WHITE	PIN 5
PIN 2	WHITE/BLACK	BLACK	PIN 3
PIN 3	WHITE/RED	RED	PIN 2
PIN 4	--	--	--

BRAID AND LIFT-EYE INSTALLATION
 ① BRING CABLE THROUGH BRAID
 20 +/- 2 INCHES BEHIND EYE
 ② 1/2" DIA. HEATSHRINK ADHESIVE TUBING 3", PN 31568
 ③ INSTALL CONNECTOR AFTER INSTALLING BRAIDED SPLICES

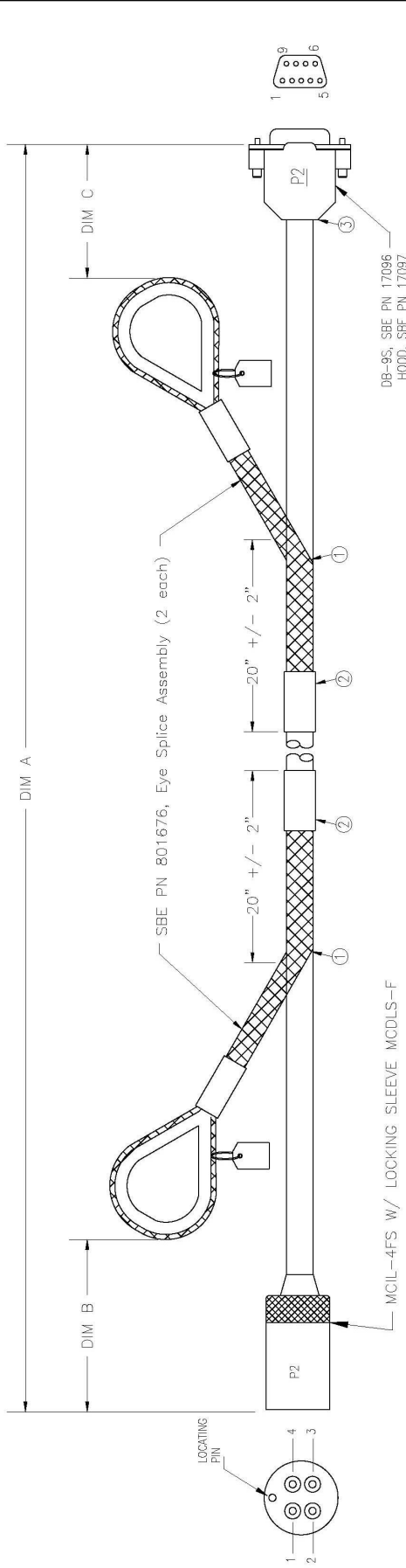


CABLE TYPE: FALMAT
 SBE PN 171285, Pigtoils per dwg 32275
 FM02099SA1 REV. B
 POLYURETHANE, KEVLAR REINFORCED, 3 CONDUCTOR, 22 AWG.
 YELLOW JACKET, NOMINAL O.D. = 0.270 IN.
 100 LBS. WORKING LOAD (45 kg)
 4 INCH MINIMUM BEND RADIUS (10 cm)

SBE PN	PIGTAIL	DIM A	DIM B	DIM C	SBE PN	PIGTAIL	DIM A	DIM B	DIM C
801140	171283	200 FT	52 IN	20 FT	801833	172476	775 FT	52 IN	20 FT
801148	171301	600 FT	52 IN	20 FT	801885	172546	20 FT	52 IN	6 FT
801150	171284	100 FT	52 IN	20 FT	801886	172547	250 FT	52 IN	20 FT
801153	171306	330 FT	52 IN	20 FT	801910	172602	230 FT	52 IN	20 FT
801293	171543	500 FT	52 IN	20 FT					
801295	171551	165 FT	52 IN	20 FT					
801301	171560	415 FT	52 IN	20 FT					
801304	171581	83 FT	52 IN	20 FT					
801307	171588	985 FT	52 IN	20 FT					
801340	171654	528 FT	52 IN	20 FT					
801352	171681	66 FT	52 IN	20 FT					
801358	171690	660 FT	52 IN	20 FT					
801514	172224	131 FT	52 IN	20 FT					

TOLERANCES	SEA-BIRD ELECTRONICS, INC	
FRACTIONAL	2/N	SCALE DRAWN BY: RMB
DECIMAL	See Table	NTS APPROVED BY:
TITLE	Load Bearing Data Cable	
ANGULAR	DATE: 4-26-98	DRAWING NUMBER: 32284
		REV: G

DATE	SW	REVISION RECORD	AUTH.	DR.	CK.
03.02	A	Add Adhesive Tubing	MJ	CB	
8.29.02	B	CHANGED LENGTH	CB	KLP	
9.23.02	C	ADJ. QTY. , LENGTH & PIN	CB	KLP	
10.7.02	D	FIXED CONN DWG AND LS DESC	CB	KLP	
10.11.02	E	CHANGED CABLE BREAK STRENGTH	CB	KLP	
9.18.06	F	ECN 9971 - COLOR CHANGE ECN 9971 - PROCESS CHANGE	CB	MJ	



P1 MCIL-4FS	COLOR	ALT COLOR	P2 DB-9S
PIN 1	WHITE	WHITE	PIN 5
PIN 2	WHITE/BLACK	BLACK	PIN 3
PIN 3	WHITE/RED	RED	PIN 2
PIN 4	--	--	--

BRAD AND LIFT-EYE INSTALLATION

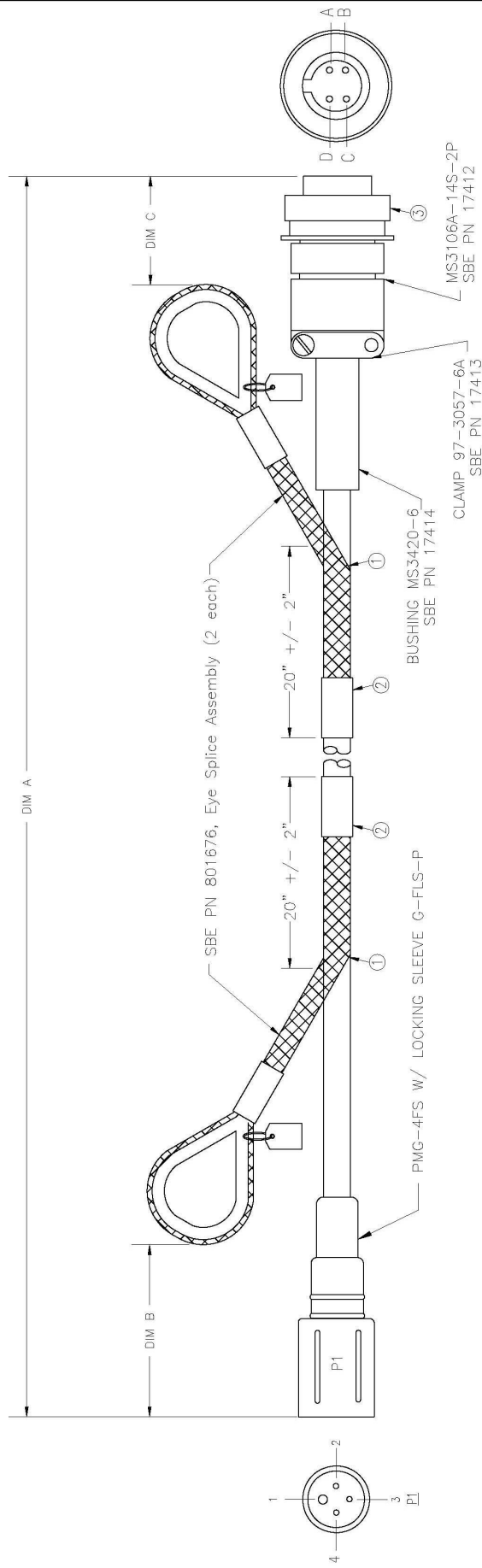
- BRING CABLE THROUGH BRAID
- 20 +/- 2 INCHES BEHIND EYE
- 1/2" DIA. HEATSHRINK ADHESIVE TUBING 3", PN 31568
- INSTALL CONNECTOR AFTER INSTALLING BRAIDED SPLICES

SBE PN	PIGTAIL	DIM A	DIM B	DIM C
801337	171633	330 FT	52 IN	20 FT
801338	171634	660 FT	52 IN	20 FT
801371	171707	100 FT	52 IN	20 FT
801372	171708	200 FT	52 IN	20 FT
801860	172494	165 FT	52 IN	20 FT

CABLE TYPE: FALMAT
 SBE PN 171285, Pigtails per dwg 32642
 FM020999SA1 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)

SEA-BIRD ELECTRONICS, INC
 P/N SEE TABLE SCALE NTS DRAWN BY MJ
 APPROVED BY
LOAD BEARING DATA CABLE
MCIL-4FS
 DATE 9.18.2006 DWG NO. 32643 SHEET 1 OF 1 REV F

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.
7/06	A	ECN 971, ALT WIRE COLOR	CB	CB	
9.18.06	B	ECN991 - Process Change	CB	MJ	



CABLE TYPE: FALMAT
 SBE PN 171285, Pigtails per dwg 32275
 FM020998A1 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)

SBE PN	PIGTAIL	DIM A	DIM B	DIM C
801442	171551	165 FT	52 IN	20 FT
801443	171808	33 FT	52 IN	20 FT
801865	171284	100 FT	52 IN	20 FT

P1 PMG-4FS	COLOR	ALT COLOR	P2 MS3106A-14S-2P
PIN 1	WHITE	WHITE	PIN A
PIN 2	WHITE/BLACK	BLACK	PIN B
PIN 3	WHITE/RED	RED	PIN C
PIN 4	--	--	--

BRAID AND LIFT-EYE INSTALLATION
 1 BRING CABLE THROUGH BRAID
 20 +/- 2 INCHES BEHIND EYE
 2 1/2" DIA. HEATSHRINK ADHESIVE TUBING 3", PN 31568
 3 INSTALL CONNECTOR AFTER INSTALLING BRAIDED SPLICES

TOLERANCES	SEA-BIRD ELECTRONICS, INC	
FRACTIONAL P/N	SCALE	DRAWN BY
See Table	NTS	KLP
DECIMAL	TITLE	APPROVED BY
	Load Bearing Data Cable	
	PMG-4FS to MS	
ANGULAR	DATE	DRAWING NUMBER
	9.18.06	32821
	REV	B

Application Note Revision History

Date	Description
2000	Initial release.
March 2002	
August 2002	
October 2002	
September 2006	<ul style="list-style-type: none">• Increase minimum cable bend radius to 4 inches.• Clarify that warranty voided if minimum cable bend radius is not met.• Make cable limitations (maximum working load, minimum bend radius) more prominent.• Update drawing revisions.• Add cable for connection to Seacat/Sealogger Interface Box.• Provide wet-pluggable connector option for all instruments.
March 2008	<ul style="list-style-type: none">• Update for 19plus V2.• Reference SCPlusV2_RS232 terminal program as well as Seaterm.• Update part number of DC Interface Box.
February 2010	<ul style="list-style-type: none">• Update for SeatermV2.• Update references to shorter cable that ships with CTD (PNs were no longer correct).• Update drawings that are part of application note (DN 32284, 32643, 32821).• Update address.
October 2012	<ul style="list-style-type: none">• Update for SBE 25<i>plus</i>.