



OPERATION AND MAINTENANCE MANUAL

DOCUMENT TITLE: Operation and Maintenance Manual 50W Type A Subsea USB System
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CLIENT: Blue Logic AS
CLIENT PO: NA
CLIENT CONTACT: NA





OBJECTIVE

The objective of this document is to cover all aspects required for safe use, operation and maintenance of the Blue Logic 50W Subsea-USB System. Relevant technical aspects for information and familiarization shall be covered as well as required technical data.

ABSTRACT

The Blue Logic 50W Subsea-USB system is based on the Unplugged / Blue Logic inductive technology for transfer of electrical power and communication subsea. The 50W connector system is part of the complete "Subsea-USB" system covering power range from 50W to 2000W with communication speeds up to 80Mbps.

In general, each Subsea-USB system consists of a Primary and a Secondary side installed in a Male and Female housing. The power is transferred from the Primary side to the Secondary side whilst communication acts in both directions.

The Male and Female Subsea-USB Connectors can be configured in the following alternatives:

1. Manually operated by hand
2. ROV operated
3. Bulkhead installation
4. Combined with hydraulic connector thus allowing for electrical power, communication and hydraulic connections to be made up using the same connector assembly.

The Blue Logic/Unplugged Subsea-USB System transfers 24VDC input voltage to 24VDC voltage from primary to secondary side over a galvanic isolated interface.

REVISION CHANGE/RECORD

REV	REASON FOR REVISION/ DESCRIPTION OF CHANGES
01	Issued for use
02	Updated to include technical data for test-connectors
04	
05	

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1. INTRODUCTION

The Blue Logic inductive connector system is designed for subsea connection and transfer of electrical power and communication. Due to the plug and play functionality of the wireless connectors, Blue Logic has given them the brand name Subsea-USB. In addition, the inductive connectors can be mounted onto hydraulic connectors thus allowing for simultaneous connection of electrical power, communication and hydraulic power.

The Subsea-USB Connectors are intelligent units which automatically detects when it is mated and immediately enables power and communication transfer.

In general, a Subsea-USB connector consist of a mechanical housing which houses required electronic PCB's and coils for transmission of power and communication.

Electrical alternatives with respect to power, voltage, current and communication set-up can be delivered upon request.

1.1. SAFETY



WARNING: The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. All users must be familiar with the contents of the appropriate manuals before attempting to install, operate, maintain or in any other way work on the equipment.

Blue Logic AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment

1.2. DOCUMENT USE

This document shall be used as general information for all aspects related to safe use, installation, removal, maintenance and storage of the 50W Type A Subsea-USB Connectors

1.3. ABBREVIATIONS

ROV: Remotely Operated Vehicle

1.4. REFERENCES

Latest version of the following documents.

Document No.	Originator	Title
BB2040	BL	USB-A 50W Program Gen1
BB2278	BL	USB-A 50W Secondary Male w/Handle Int. Alt. Plastic Ring
BB2306	BL	USB-A 50W Female Flange Mount Inductive Connector Interv
BB2336	BL	USB-A 50W Primary Test Unit wCables
BB2332	BL	USB-A 50W Secondary Test Unit wCables

1.5. TECHNICAL DESCRIPTION

1.6. SYSTEM OVERVIEW

The Blue Logic 50W Subsea-USB System can be delivered with a variety of mechanical configurations and interfaces as illustrated in below figure.



Figure 1 - USB - A system

1.7. MATING INTERFACES

The 50W Subsea-USB connector is a ROV friendly and compact inductive connector system designed primarily for intervention purposes suitable for all types of ROV tools where electrical power and electronic communication is required.



Figure 2 - Mating interface

The connector system is available with either a mechanical installation interface, or with a guiding system that locks the primary and secondary unit together. The guiding system is equipped with a friction lock solution which is specially designed for ROV use.

The guide system can be delivered with or without a mechanical flange for panel installation or ROV handle as shown in Figure 2.



Figure 3 - Typical Male Stab



Figure 4 - Typical Female Receptacle

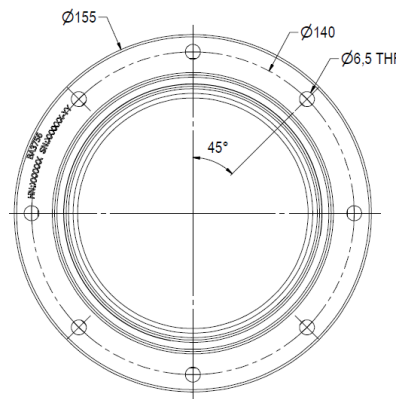


Figure 5 - Installation flange

Installation flange interface is 8 x Ø6.5 on PCD 140mm as shown on above figure.

1.8. TECHNICAL DATA

Overall dimensions	See Assembly Drawing
Design Water Depth	3000 m
Input Voltage Primary Side	22-50 VDC
Output Voltage	24 VDC
Max Power Transfer	50 W
Communication Protocol	RS232, RS485*+ Ethernet
Communication speed RS232	230 Kbps
Communication Speed Ethernet	80 Mbps
Electrical Connector, Primary Side	SubConn Power Ethernet Circular - 13 contacts
Electrical Connector, Secondary Side	SubConn Power Ethernet Circular - 13 contacts

** Connector system can be configured for RS485 upon request.

1.9. PIN CONFIGURATION

The Standard 50W Subsea-USB Connectors is equipped with Subconn Power Ethernet Circular - 13 contacts Connectors. Other connectors are however available upon request as special deliveries.

Primary side Subsea-USB Connectors are equipped with Male Subconn Connectors while Secondary Side are equipped with female connectors.

Primary Side with RS232 and RS485	
Connector: Power Ethernet Circular - 13 contacts	
Pin #	Signal
Pin 1	+V IN
Pin 2	CHASSIS
Pin 3	-V IN
Pin 4	TX_p
Pin 5	TX_n
Pin 6	RX_p
Pin 7	RX_n
Pin 8	N/A
Pin 9	RS232 + RX (incoming data)
Pin 10	RS232 + TX (outgoing data)
Pin 11	RS232 GND
Pin 12	RS485A
Pin 13	RS485B

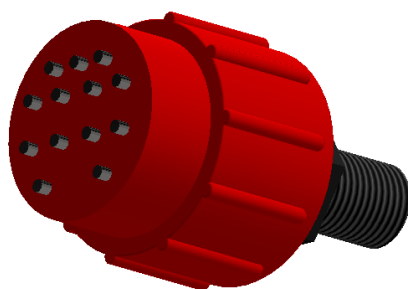


Figure 6-Power Ethernet Circular - 13 contacts (male)

Secondary Side with RS232 and RS485	
Connector: Power Ethernet Circular - 13 contacts	
Pin #	Signal
Pin 1	+V OUT
Pin 2	CHASSIS
Pin 3	-V OUT
Pin 4	TX_p
Pin 5	TX_n
Pin 6	RX_p
Pin 7	RX_n
Pin 8	N/A
Pin 9	RS232 + RX (incoming data)
Pin 10	RS232 + TX (outgoing data)
Pin 11	RS232 GND
Pin 12	RS485A
Pin 13	RS485B

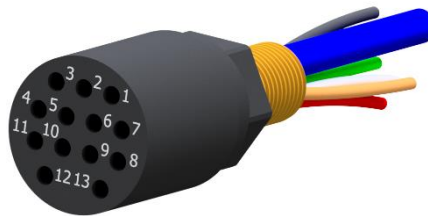


Figure 7 - SubConn Power Ethernet Circular - 13 contacts (female)



1.10. IP ADDRESS CONFIGURATION

All Subsea-USB systems are delivered with a fixed IP address. The used addresses are listed in table below. It is recommended to avoid having other equipment in the same network using the same IP address. Other IP configurations of the Subsea-USB system are however available upon request as special deliveries. The IP addresses of the Subsea-USB system do not affect the transmission of data and it is not required that the IP address of the Subsea-USB system lies within the IP range of the network.

Unit	IP Address
Primary side	192.168.1.253
Secondary side	192.168.1.254

1.11. LED INDICATOR LIGHTS

Some 50W connectors have LED indicator lights visible for ROV showing status of the Subsea-USB connector during use and connecting.



Figure 8: LED Indicator lights

Name	LED Status	Description
POW (Primary side)	On	Start-up voltage limit passed*
	Blinking	Alarm state
POW (Secondary side)	On	Output voltage activated
	Blinking	Alarm state
ETH	On	Ethernet connection made
	Blinking	Data transmitted or received
RX	On	System ready to receive data
	Blinking	System receiving data
TX	On	Primary and Secondary side connected System ready to send data
	Blinking	System sending data

* Turned on "Pow" LED Primary side does not verify that the input voltage is within the specified range.

1.12. TEST CONNECTORS

1.12.1. 50W Secondary Test Connector

The purpose of this connector is to facilitate testing of the primary side connector. The test connector comes with power cable and communication cable for RS232/RS485

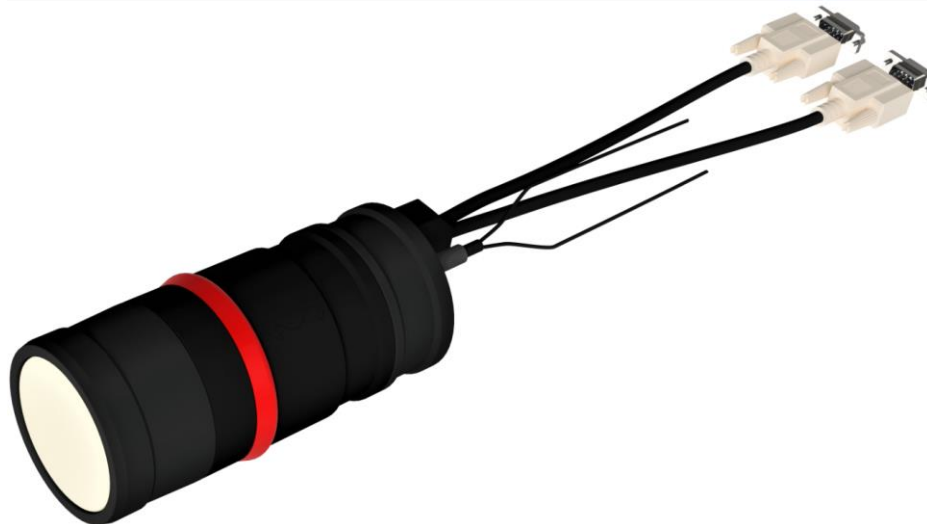


Figure 9, BB2332 50W Secondary side test connector

Secondary Side Test Connector Communication Cable, RS232 and RS485		
Connector 1: DE-9 Female for RS232		Connector 2: DE-9 Female for RS485
Pin 1	N/A	N/A
Pin 2	RS232 RX	N/A
Pin 3	RS232 TX	RS485 B+
Pin 4	N/A	N/A
Pin 5	RS232 GND	RS485 GND
Pin 6	N/A	N/A
Pin 7	N/A	RS485 B-
Pin 8	N/A	N/A
Pin 9	N/A	N/A
Pin 10	Shield	Shield

Secondary Side Test Connector Power Cable Cable: 30-0068, AWG18, 3000mm	
Pin 1 / Red	V+
Pin 2 / Black	V-

1.12.2. 50W Primary Test Connector

The purpose of this connector is to facilitate testing of the secondary side connector. The test connector comes with power cable and communication cable for RS232/RS485

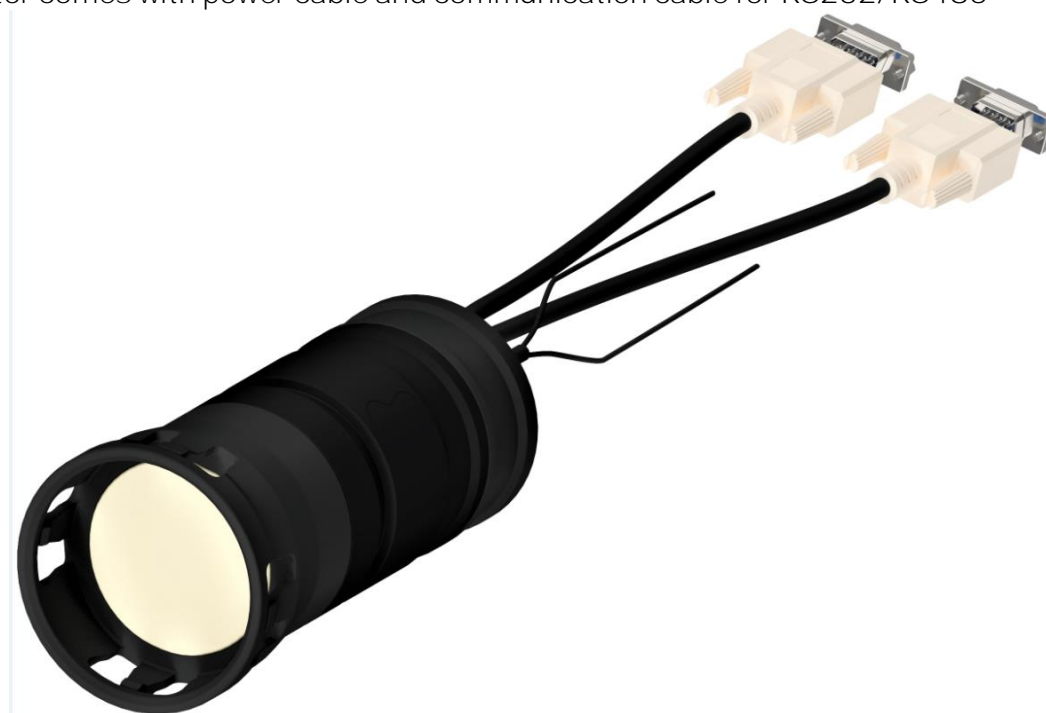


Figure 10, BB2336 50W Primary side test connector

Primary Side Test Connector with RS232 and RS485		
Connector: DE-9 Female for RS232		Connector: DE-9 Female for RS485
Pin 1	N/A	N/A
Pin 2	RS232 RX	N/A
Pin 3	RS232 TX	RS485 B+
Pin 4	N/A	N/A
Pin 5	RS232 GND	RS485 GND
Pin 6	N/A	N/A
Pin 7	N/A	RS485 B-
Pin 8	N/A	N/A
Pin 9	N/A	N/A
Pin 10	Shield	Shield

Primary Side Test Connector Power Cable	
Cable: 30-0068, AWG18, 3000mm	
Pin 1 / Red	V+
Pin 2 / Black	V-

1.13. 50W SUBSEA-USB COMBINED WITH HYDRAULIC CONNECTORS

Blue Logic Subsea-USB systems can be combined with hydraulic connectors to form a combined multifunctional connectors system allowing for both hydraulic and electrical connection in the same interface. Installation brackets are available for most types of Blue Logic delivered stab systems, both Hot Stabs and Valve stabs. Installation of the Subsea-USB units onto hydraulic stab's is performed in accordance with the dedicated assembly drawings. Mating/ de-mating of the combined system shall be performed in accordance with the manual for the hydraulic connector system (Hot Stab or Valve Stab).

Note that Valve Stab connectors are rotation dependent and are not correctly docked before the indicator pin is activated.



Figure 11 - Subsea-USB installed on a 3-Port Valve Stab receptacle. Illustration picture.



Figure 12 - Subsea-USB installed on a 3-Port Male Valve Stab. Illustration picture.

2. OPERATION

2.1. PRE DIVE CHECK LIST

No.	Description	Chk/Verified
01	Perform a function test by connecting primary and secondary side. <ul style="list-style-type: none"> - Test communication - Test Power transfer 	
02	Perform a visual inspection of primary side connector <ul style="list-style-type: none"> - Housing - Seals - Coil Surface - Connector 	
03	Perform a visual inspection of secondary side connector <ul style="list-style-type: none"> - Housing - Seals - Coil Surface - Connector 	
04	If the Subsea-USB Connector is connected to a hydraulic connector, ensure that the mechanical bracket is undamaged and that the primary and secondary side is connected parallel when the hydraulic connector is fully mated.	

2.2. CONNECTION

No.	Description	Chk/Verified
01	Inspect the stab/receptacles to be mated by ROV visually. Verify that mating surfaces are clean	
02	By use of the ROV manipulator gently mate the male and female (primary/secondary) connectors.	
03	Verify that the connectors are fully mated and that cables are undamaged	
04	Verify that power and communication is transferred between the connectors	

2.3. DISCONNECTION

No.	Description	Chk/Verified
01	Inspect the male/female stab system	
02	Inspect cables and connectors	
03	Gently grab the connector through the ROV handle and pull the stab slowly out from receptacle	
04	Inspect stab, receptacle, cables and connectors	

2.4. POST DIVE CHECK LIST

No.	Description	Chk/Verified
01	Recover system to deck	
02	Inspect all components and parts. Special attention to the following: <ul style="list-style-type: none"> - Housing - Surface treatment - Corrosion - Seal - Coil surfaces - Cables - Penetrators - Connectors - Mechanical interfaces 	
03	Flush all components and parts thoroughly with fresh water	
04	Connect System and perform a full system check	

APPENDIX 1 DRAWINGS

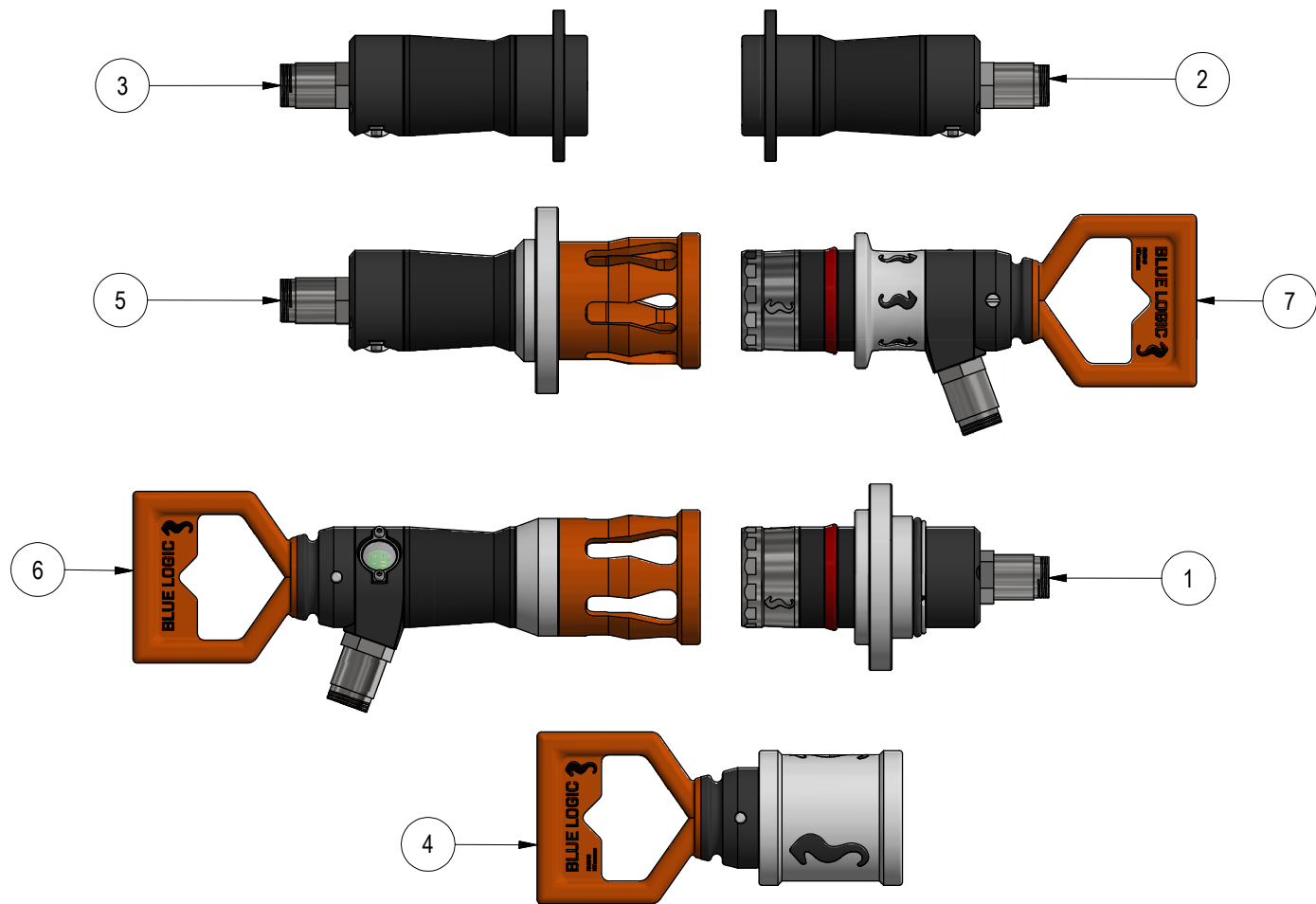
BB2040	USB-A 50W Program Gen1
BB2278	USB-A 50W Secondary Male w/Handle Int. Alt. Plastic Ring
BB2336	USB-A 50W Primary Test Unit wCables
BB2332	USB-A 50W Secondary Test Unit wCables

Parts List			
ITEM	PART No.	TITLE	e-Sea WebLink
1	BB8585	USB-A 50W Male wFlange Intervention	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB8585
2	BB2428	USB-A 50W Flat Flange Mount Inductive Connector Interv Sec	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2428
3	BB2426	USB-A 50W Flat Flange Mount Inductive Connector Interv Pri	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2426
4	BB2340	Protection Cap Assy 50W	on request
5	BB2306	USB-A 50W Female Flange Mount Inductive Connector Interv	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2306
6	BB2288	USB-A 50W Primary Female w/Handle	on request
7	BB2278	USB-A 50W Secondary Male w/Handle Int. Alt. Plastic Ring	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2278

INTERVENTION PROGRAM

PRIMARY

SECONDARY



NOTE: 1

ADDITIONAL INFORMATION:

The Subsea USB 50W system is based on the Unplugged inductive technology for transfer of electrical power and communication subsea. The 50W connector system is part of the complete "Subsea-USB" system covering power range from 50W to 3000W with communication speeds up to 1 Gbit/s.

In general, each Inductive system consists of a Primary (TX) and a Secondary (RX) side installed in a ROV friendly housing. The power is transferred from the Primary side to the Secondary side whilst communication is operated in full duplex.

The Subsea-USB Connectors can be configured in the following alternatives:

1. Manually operated by hand
2. ROV operated.
3. Bulkhead piggy backed on other equipment.
4. Combined with hydraulic connector thus allowing for electrical power, communication and hydraulic connections to be made up using the same connector assembly

Input voltage 22-50VDC at primary side and 24VDC voltage output on the secondary side. The inductive coils are galvanically isolated from each other and can be looked at as a 1 to 1 transformer. The 50W system has 13-pin connector where both RS232, RS485 (230kbps), Ethernet (80Mbps) and Power are available on both sides. Feasible to have RS232 connected on the Secondary side (tool side) and RS485 connected on the primary side (ROV side). Most systems rated to 3000m water depth.

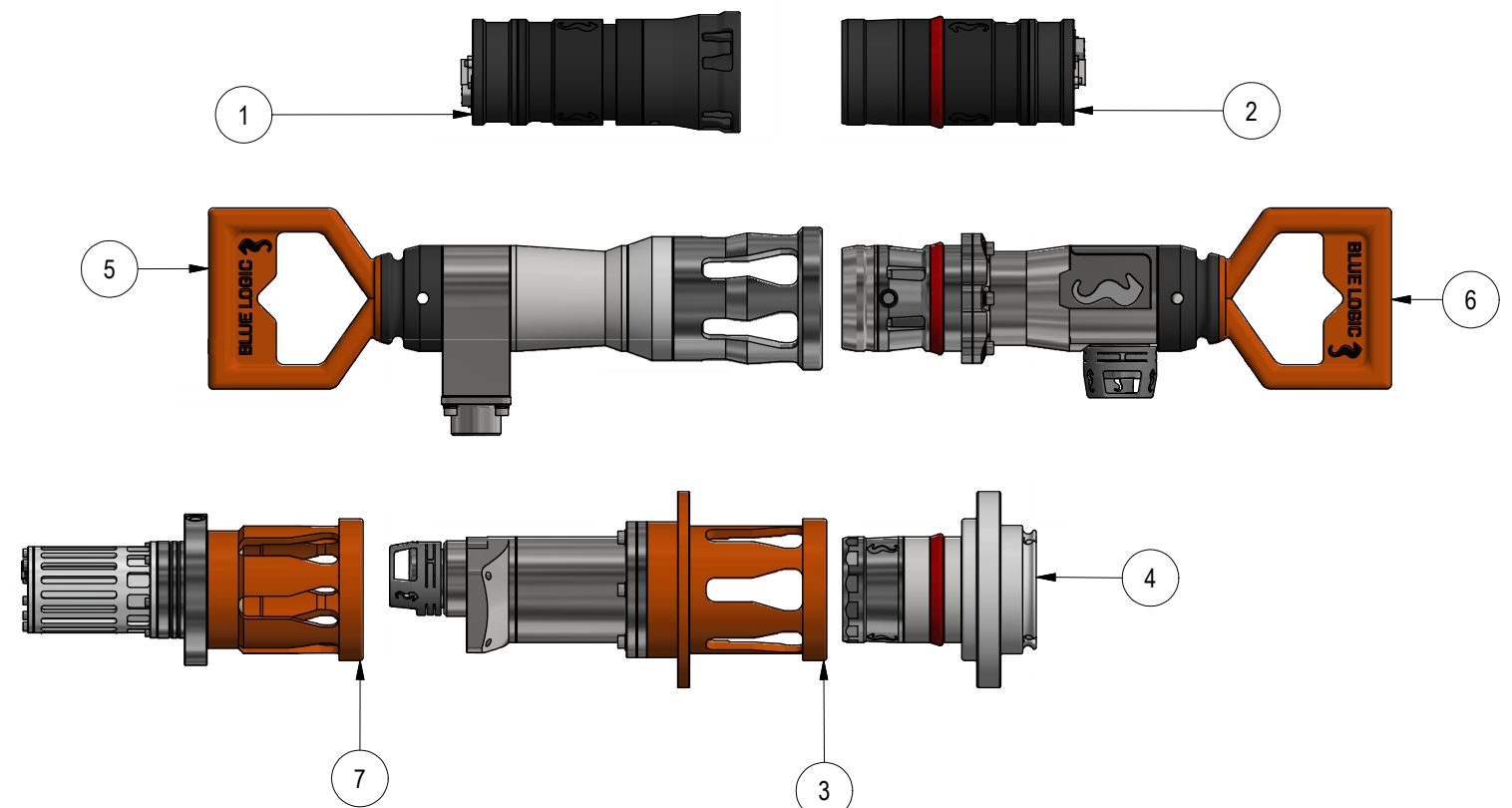
The system can be delivered in the following material types: Aluminium or Super duplex. It is recommended to always include the connector in the CP protection system and make sure it is in galvanic contact. Aluminium is designed for short-term (intervention) use. Super Duplex version has a design life of 3-5 years.

Parts List			
ITEM	PART No.	TITLE	e-Sea WebLink
1	BB9047	USB-A 50W Primary Test Unit	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB9047
2	BB9046	USB-A 50W Secondary Test Unit	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB9046
3	BB5385	USB-A 50W Female Flange Mount Inductive Conn. Long-term	on request
4	BB2719	USB-A 50W Male wFlange Long-term	http://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2719
5	BB2718	USB-A 50W Secondary Female w/Handle Perm	on request
6	BB2265	USB-A 50W Secondary Male w/Handle Long Term Use	http://e-sea.bluelogic.no/main.aspx?page=article&artno=BB2265
7	BB8587	USB-A 50W Female Flange Mount Inductive Conn. Long-term	https://e-sea.bluelogic.no/main.aspx?page=article&artno=BB8587

LONG-TERM PROGRAM

PRIMARY

SECONDARY



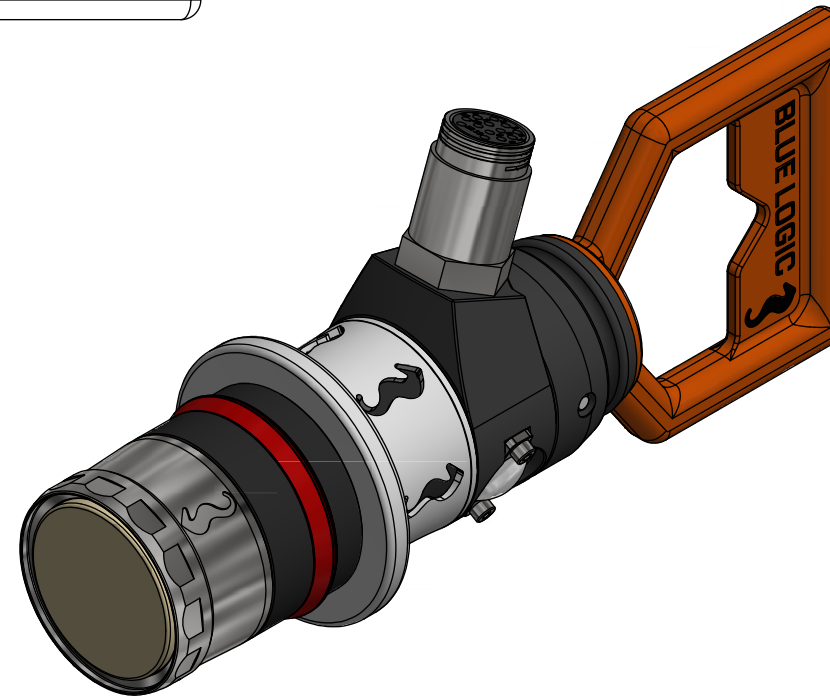
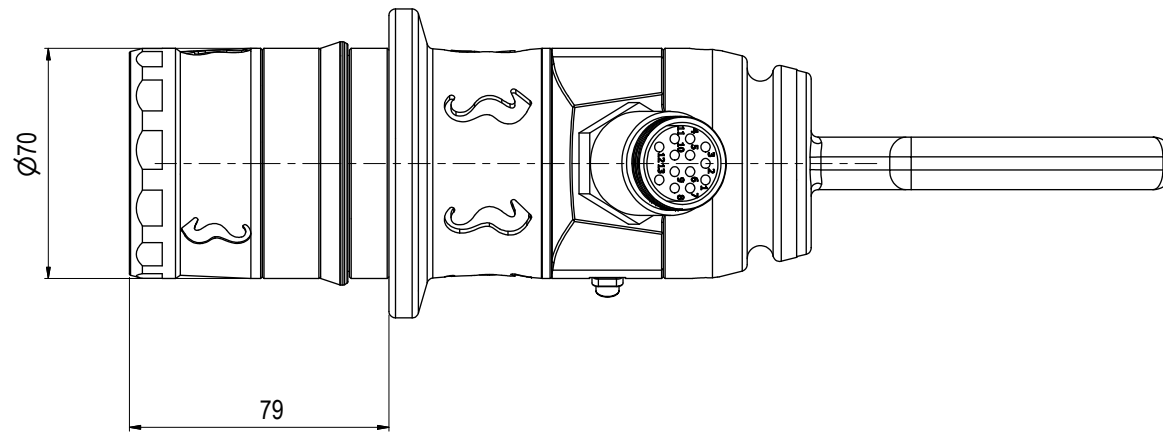
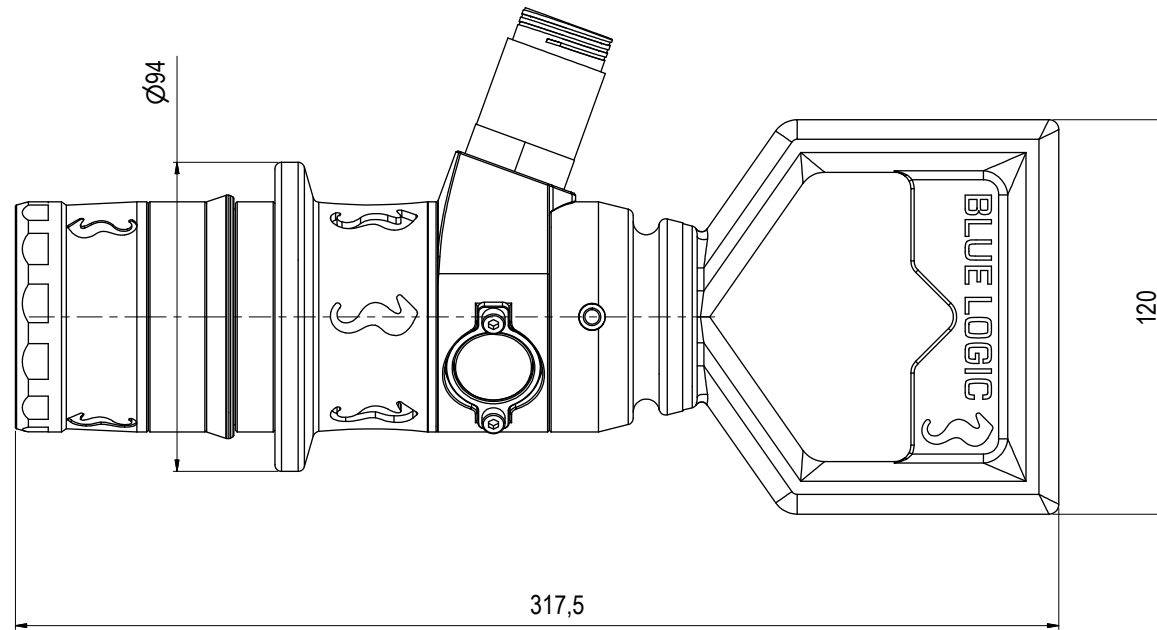
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Rev.	Date	Reason for issue	Revision change	WTJ	LGH	HSE
01	15.2.2024	3-IFI (Issued for Information)				
				Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	USB-A 50W Program Gen1
Drawing number:	BB2040
Rev.	01



NOTE: 1
DESIGN CODE:
N/A

NOTE: 2
TECHNICAL CLASSIFICATION:
Article Type: 006-EI. Connectors
Main Group: 6.01. Subsea USB
Intermediate Group: 6.28.01. 0-60W Subsea USB
Sub Group: 6.28.95.01. Male Connector

NOTE: 3
INTERFACE INFORMATION:
Pressure Rating Bar: N/A
Design Water Depth: 3000m
Material: N/A
Weight: 2,6 kg
Volume: 0,74 dm³
Submerged Weight: 1,85 kg
Surface Area: 3330 cm²
Hydraulic: N/A
Mechanical: Subconn. Ethernet DBCR2013F
Electrical: N/A
Com. & Protocol: N/A

NOTE: 4
OPERATION & MAINTENANCE INFORMATION:
600128-TD-0020

NOTE: 5
ADDITIONAL INFORMATION:
Inductive Subsea Connector for transfer of electrical power and communication. The Blue Logic inductive connector is a multipurpose electrical connector with the capacity of transferring up to 50W electrical power, 80Mbps Ethernet and 230kbps serial communication on RS232 or RS485. Easy to connect and disconnect by divers, ROV or AUV's. BB2278 is a male connector, configured to be the secondary side (receiving part) in a connector system. Designed for short-term (intervention) subsea service down to 3000m water depth.

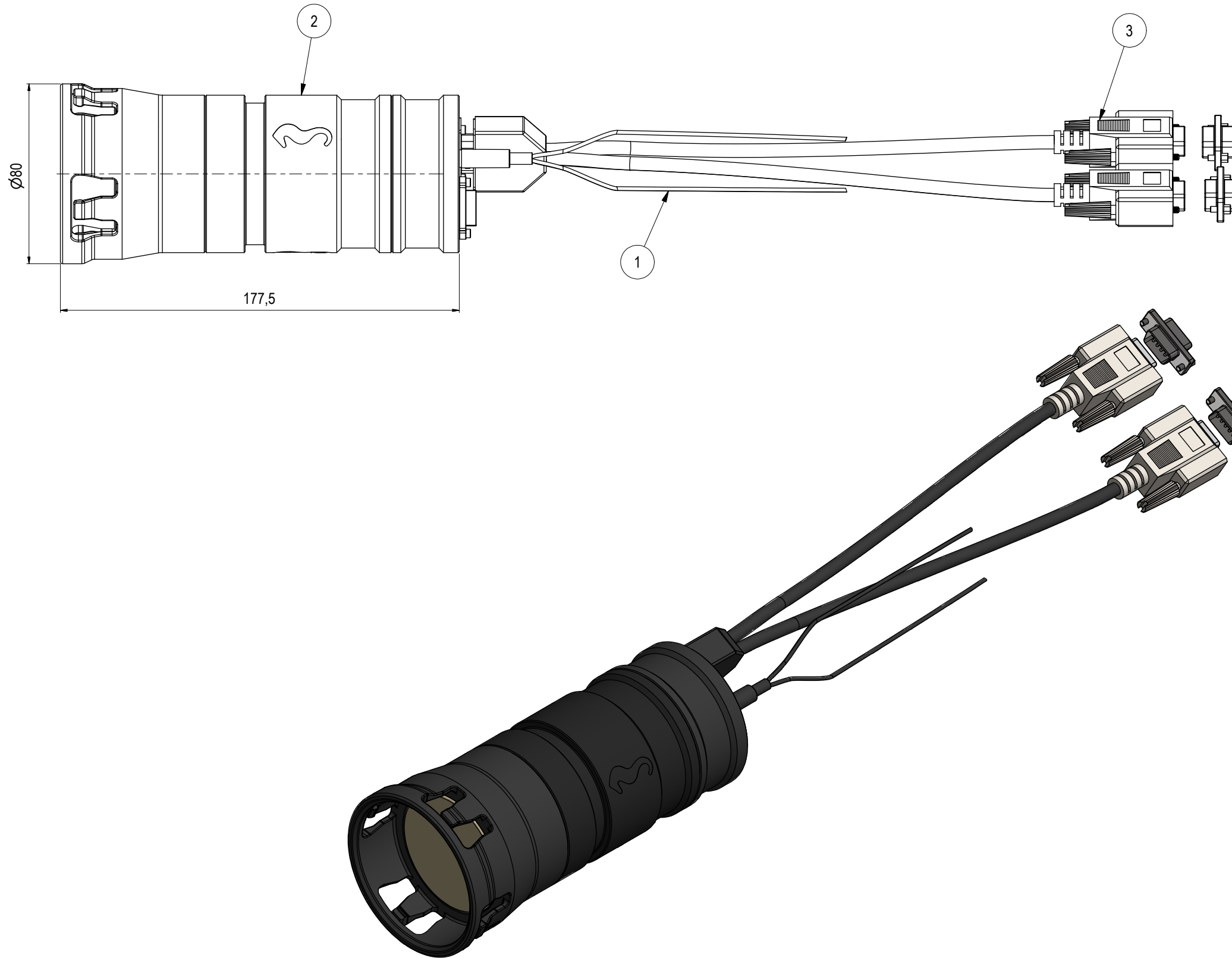
07	22.8.2023	9-IFU (Issued for Use)		WTJ	LGH	WTJ
06	1.12.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
05	21.1.2020	9-IFU (Issued for Use)		WTJ	LGH	WTJ
04	24.6.2019	9-IFU (Issued for Use)		WTJ	LGH	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	USB-A 50W Secondary Male w/Handle Int. Alt. Plastic Ring
Drawing number:	BB2278
Rev:	07

Parts List					
ITEM	QTY	PART No.	TITLE	WebLink	
1	1	BC0046	Power Cable Pri Side	N/A	
2	1	BB9047	USB-A 50W Primary Test Unit	http://e-sea.bluelogic.no/main.aspx?page=article&artno=BA6047	
3	1	BB8896	Cable RS232/RS485	N/A	



NOTE: 1
DESIGN CODE:
N/A

NOTE: 2
TECHNICAL CLASSIFICATION:
Article Type: 006-EI. Connectors
Main Group: 6.01. Subsea USB
Intermediate Group: 18.190.01. USB-A
Sub Group: 6.28.95.01. Male Connector

NOTE: 3
INTERFACE INFORMATION:
Pressure Rating Bar: N/A
Design Water Depth: N/A
Material: Long-term
Weight: 0,7 kg
Volume: 0,45 dm³
Submerged Weight: 0,19 kg
Surface Area: 2715 cm²
Hydraulic: N/A
Mechanical: N/A
Electrical: N/A
Com. & Protocol: N/A

NOTE: 4
OPERATION & MAINTENANCE INFORMATION:
600128-TD-0020

NOTE: 5
ADDITIONAL INFORMATION:
Power cable for BB2332, Secondary Side Test Connector. Complete with DC power plug for connection to Test Connector. Cable consists of 2 separate AWG18 cables with pigtail to suit any connection to power supply. Total cable length 3m.

Communication cable for BB2332, Secondary Side Test Connector. Complete with D-Sub connector for connection to Test Connector. Two separate cables with female socket connector of type DE-9 for RS232 and RS485 communication. Total cable length 3m.

09	5.7.2023	9-IFU (Issued for Use)		WTJ	ERO	WTJ
08	25.4.2023	9-IFU (Issued for Use)		WTJ	RAN	TGU
07	1.12.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
06	16.11.2022	9-IFU (Issued for Use)		WTJ	SEA	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



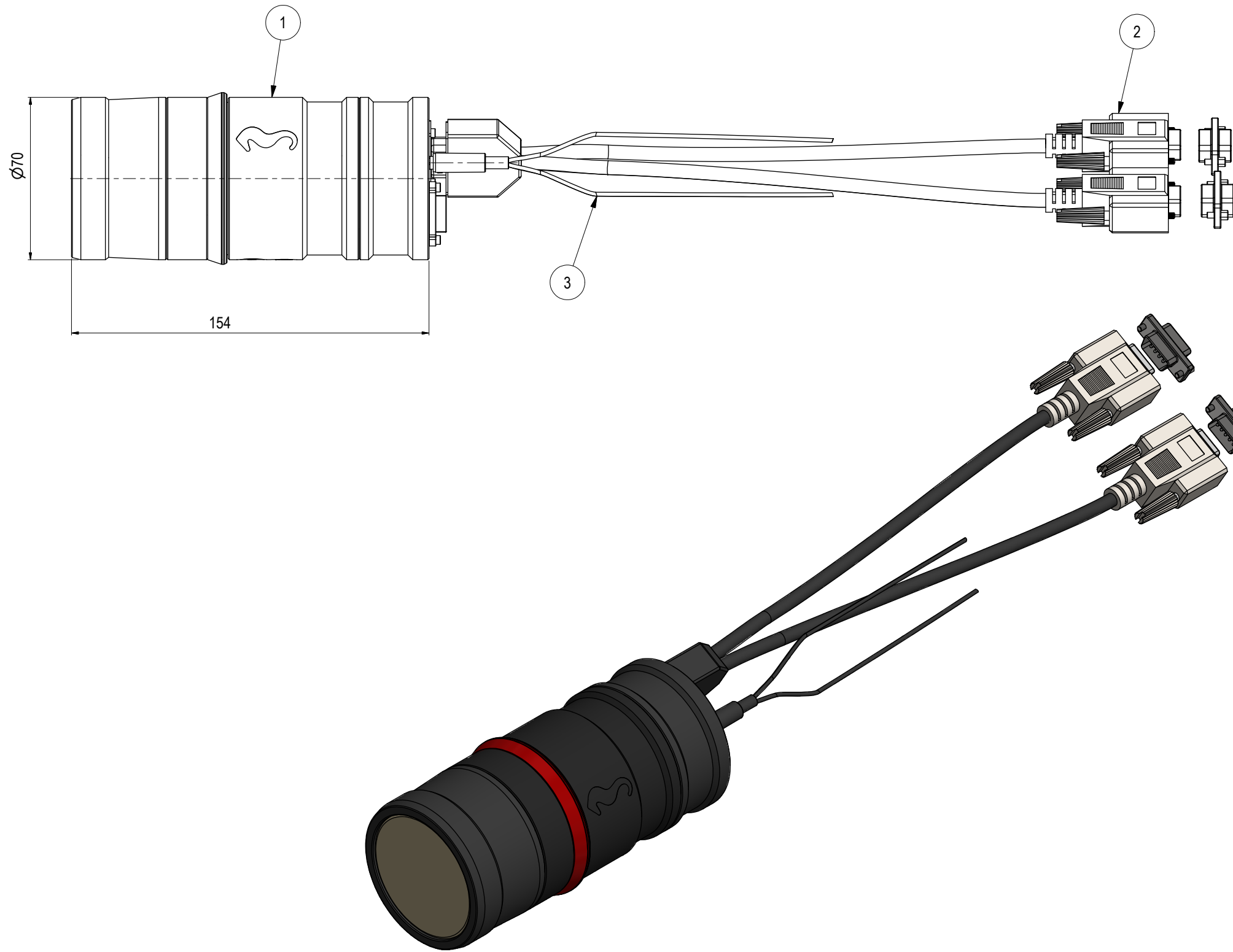
Dwg Scale:
NTS
Dwg Proj:
Dwg Format:
A3

Drawing title:
USB-A 50W Primary Test Unit wCables

Drawing number:
BB2336

Rev.
09

Parts List				
ITEM	QTY	PART No.	TITLE	WebLink
1	1	BB9046	USB-A 50W Secondary Test Unit	http://e-sea.bluelogic.no/main.aspx?page=article&artno=BA6047
2	1	BB8896	Cable RS232/RS485	N/A
3	1	BB8895	Power Cable Sec Side	N/A



NOTE: 1
DESIGN CODE:
N/A

NOTE: 2
TECHNICAL CLASSIFICATION:
Article Type: 006-EI. Connectors
Main Group: 6.01. Subsea USB
Intermediate Group: 18.190.01. USB-A
Sub Group: 6.28.95.01. Male Connector

NOTE: 3
INTERFACE INFORMATION:
Pressure Rating Bar: N/A
Design Water Depth: N/A
Material: N/A
Weight: 0,6 kg
Volume: 0,43 dm³
Submerged Weight: 0,19 kg
Surface Area: 2640 cm²
Hydraulic: N/A
Mechanical: N/A
Electrical: N/A
Com. & Protocol: N/A

NOTE: 4
OPERATION & MAINTENANCE INFORMATION:
600128-TD-0020

NOTE: 5
ADDITIONAL INFORMATION:
Power cable for BB2332, Secondary Side Test Connector. Complete with DC power plug for connection to Test Connector. Cable consists of 2 separate AWG18 cables with pigtail to suit any connection to power supply. Total cable length 3m.

Communication cable for BB2332, Secondary Side Test Connector. Complete with D-Sub connector for connection to Test Connector. Two separate cables with female socket connector of type DE-9 for RS232 and RS485 communication. Total cable length 3m.

09	5.7.2023	9-IFU (Issued for Use)		WTJ	ERO	WTJ
08	25.4.2023	9-IFU (Issued for Use)		WTJ	RAN	TGU
07	1.12.2022	9-IFU (Issued for Use)		WTJ	LGH	WTJ
06	19.10.2022	9-IFU (Issued for Use)		WTJ	SEA	WTJ
Rev.	Date	Reason for issue	Revision change	Made	Chk'd	Appr.



Dwg Scale:	NTS
Dwg Proj:	
Dwg Format:	A3

Drawing title:	USB-A 50W Secondary Test Unit wCables	
Drawing number:	BB2332	Rev. 09