SplitBox
Interfacing with Ekinox and Apogee

User Manual

SBG SYSTEMS

Revision history

Rev.	Date	Author	Information
1.2	May 14, 2018	Raphaël Siryani	[SPLITBOXUM-2] Updated company address
1.1	Jun 9, 2016	Alexis Guinamard	[SPLITBOXUM-1] Update support contact details
1	Feb 25, 2015	Nicolas Michel	First version of this document

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1. Introduction

The SplitBox from SBG Systems is a complementary accessory of the Ekinox and Apogee series. It provides a simplified interface with standard connectors to ease both the setup and integration. It replaces the 19 pins Fisher Connectors of the Ekinox and Apogee by standards M-12, SMA, and DB-9 connectors corresponding to each port.

The front face of the box gives access to the standard connectors, while the back face is connected directly to the Ekinox or the Apogee using 5 meters cables.

1.1. SplitBox Versions

The SplitBox comes in different versions to meet all customer requirements. This manual is common for all versions, so you should only look to the appropriate section of this document for your specific SplitBox.

SplitBox ordering code	Description
SPLITBOX-STD	Standard surface without GNSS receiver
SPLITBOX-STD-S	Standard surface with Septentrio internal GNSS receiver
SPLITBOX-STD-T	Standard surface with Trimble internal GNSS receiver
SPLITBOX-SUB	Subsea without GNSS receiver
SPLITBOX-SUB-S	Subsea with Septentrio internal GNSS receiver
SPLITBOX-SUB-T	Subsea with Trimble internal GNSS receiver

1.2. Package content

In addition to the SplitBox module, a set of accessories and cables is included in the package to facilitate user integration:

- International AC/DC power supply
- An Ethernet cable
- A set of TNC / SMA / BNC adapters for synchronization signals

> **Note:** In order to allow different cable lengths, the cables required to connect the Splitbox to an Ekinox/Apogee should be ordered separately.

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1.3. SplitBox Septentrio specifications (models -S)

The SPLITBOX-STD-S and SPLITBOX-SUB-S embed a very high end, survey grade, dual antenna, Septentrio GNSS receiver that is perfectly fitted for the very demanding survey market.

It features L1/L2/L5 and L-Band signals tracking and uses GPS, GLONASS, BEIDOU and GALILEO constellations to provide very accurate and reliable measurements even in harsh environments.

The internal dual L-Band demodulator supports Terrastar and Veripos Precise Point Positioning (PPP) services to delivery world wide, with no specific infrastructure, a positioning accuracy better than 10 cm.

This latest generation GNSS receiver also features very accurate RTK positioning with the world's leading signal availability and minimal re-acquisition time after a GPS outage. With a refresh rate of 20Hz, this receiver provides best accuracy and reliability in harsh GNSS environments thanks to a very advanced auto mitigating algorithm that detects and eliminates multi-path situations or Inmarsat / Iridium jamming.

	Specification		Remark
Channels	448		
Signal tracking	**GPS**: L1, L2, L2C, L5 **GLONASS**: L1, L2, L2CA **Galileo**: E1, E5ab, E6	**Beidou** B1, B2, B3 **SBAS**, **QZSS**	Galileo and Beidou signals are available in option
Horizontal position accuracy	Single point L1/L2/L5	1.0 m	PPP support is available in option and requires a valid subscription from a third party PPP service provided.
	SBAS / DGPS	0.6 m / 0.4 m	
	PPP (Terrastar, Veripos)	10 cm	
	RTK	0.6 cm + 0.5 ppm	RTK positioning mode available in option
Velocity accuracy	0.8 cm/s RMS		
True Heading Accuracy	0.2 ° 0.1 ° 0.05 °	1m baseline 2m baseline 4m baseline	Baseline should not exceed 10m GNSS only true heading accuracy, not enhanced by the INS.
Operating Limits	Velocity: 515 m/s * Acceleration: 10g		*Due to export control
Time to First Fix	Cold start	< 45 s	
	Hot start	< 15 s	
Signal reacquisition	L1/L2/L5	< 1.0 s	
Output frequency	20 Hz		5Hz outputs recommended for operation with Ekinox / Apogee.
Available Options	SW-SEP-Ax4-PPP		Adds Terrastar & Veripos support
	SW-SEP-Ax4-RTK		Adds Real Time Kinematics support
	SW-SEP-Ax4-RAW		Adds RAW data output for post processing
	SW-SEP-Ax4-BEIDOU		Adds Beidou constellation support
	SW-SEP-Ax4-GALILEO		Adds Galileo constellation support

> **Note:** All these specifications reflect the intrinsic GNSS receiver accuracy. Please also refers to the Inertial Navigation System (INS) that will be paired to the SplitBox for further specifications.

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1.4. SplitBox Trimble specifications (models -T)

The SPLITBOX-STD-T and SPLITBOX-SUB-T embed a very high end, survey grade, dual antenna, Trimble GNSS receiver that is perfectly fitted for the very demanding survey market.

It features L1/L2/L5 and L-Band signals tracking and uses GPS, GLONASS, BEIDOU and GALILEO constellations to provide very accurate and reliable measurements even in harsh environments.

The internal L-Band demodulator supports OmniSTAR and Marinestar Precise Point Positioning (PPP) services to delivery world wide, with no specific infrastructure, a positioning accuracy better than 10 cm.

This high performance GNSS receiver also features very accurate RTK positioning as well as a cost effective RTK10 option featuring 10cm positioning accuracy. With a max refresh rate of 50Hz, this receiver provides excellent accuracy and reliability in harsh GNSS environments.

	Specification		Remark
Channels	220		
Signal tracking	**GPS**: L1 C/A, L2E, L2C, L5 **GLONASS**: L1 C/A, L2 C/A, L2 P, L3 CDMA **Galileo**: 1 BOC, E5A, E5B, E5AltBOC **Beidou** B1, B2 **SBAS**, **QZSS** **L-Band** OmniSTAR VBS, HP, XP		Galileo and Beidou signals are available in option
Horizontal position accuracy (1 sigma)	SBAS / DGPS	0.5 m / 0.25 m	PPP support is available in option and requires a valid subscription from a third party PPP service provided.
	PPP	10 cm	
	RTK	0.8 cm + 1 ppm	RTK positioning mode available in option
Velocity accuracy	0.7 cm/s RMS		
True Heading Accuracy	0.09 ° 0.05 °	2m baseline 10m baseline	Baseline should not exceed 10m GNSS only true heading accuracy, not enhanced by the INS.
Operating Limits	Altitude: 18 000m * Velocity: 515 m/s * Acceleration: 11g		*Due to export control
Time to First Fix	Cold start	< 45 s	
	Warm start	< 30 s	
Signal reacquisition	L1/L2/L5	< 2.0 s	
Max Output frequency	50 Hz		5Hz outputs recommended for operation with Ekinox / Apogee.
Available Options	SW-TRI-BD982-RTK10		Adds RTK 10/10 option
	SW-TRI-BD982-RTK		Adds Real Time Kinematics support + RAW Data output
	SW-TRI-BD982-RAW		Adds RAW data output for post processing
	SW-TRI-BD982-BEIDOU		Adds Beidou constellation support
	SW-TRI-BD982-GALILEO		Adds Galileo constellation support

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2. Typical connection diagrams

As a rule of thumb, all serial ports on the Ekinox/Apogee should be configured in RS-422 mode as the communication between the SplitBox and the Ekinox/Apogee is using the RS-422 protocol. The RS-422 protocol is much more secure than the RS-232 especially over long distances.

Each SplitBox serial ports can however be individually configured, for RS-232 or RS-422 levels. This is done using dedicated switched that are present on the back face of the SplitBox unit. Please refer to section 4.4 Configuration Switches for detailed information about switches usage and functions.

2.1. SplitBox without integrated GNSS

The SplitBox models without embedded GNSS receiver connections are quite straightforward, as all Ekinox/ Apogee ports map directly to a SplitBox port.
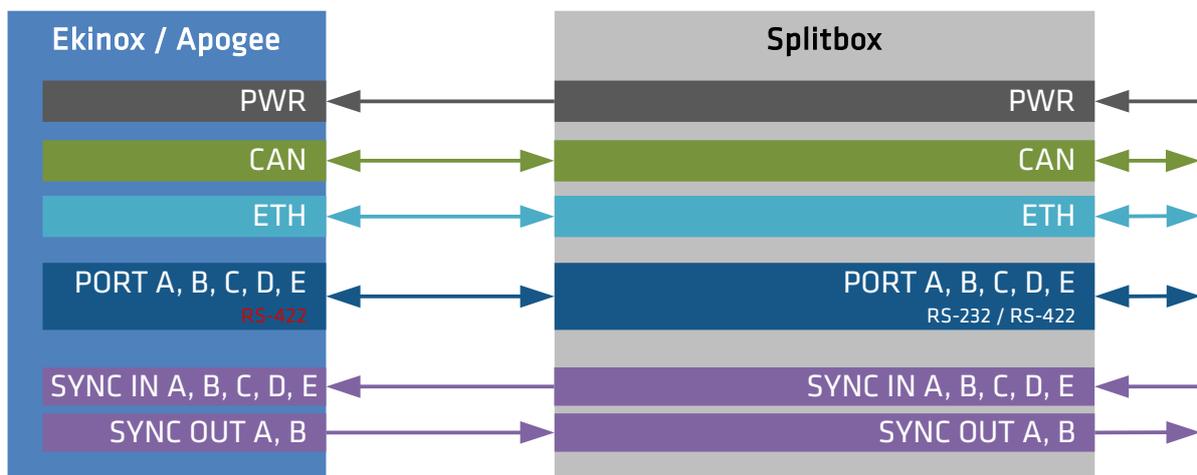
Figure 2.1: SplitBox without GNSS connection diagram

> ⚠ **Warning:** The subsea version doesn't support CAN communications. In addition, the Sync In C is not available for subsea units.

2.2. SplitBox with GNSS (models -S or -T)

On the SplitBox equipped with an internal GNSS receiver, the connections are also straight forward for all ports except for the PORT D.

As shown on the diagram below, the GNSS receiver COM3 is directly connected to the Ekinox/Apogee PORT D. This serial port is thus used by the Ekinox/Apogee to receive GPS data from the SplitBox to be integrated into the navigation solution.

On the SplitBox side, the PORT D has two functions that can be selected using the configuration switches present on the back face of the SplitBox:

- GPS configuration, in this mode, the PORT D Rx and Tx signals are directly connected to the internal GNSS receiver COM 1. This serial link can be used to access and configure the GNSS receiver.

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- RTCM input, in this mode, the PORT D Rx is connected to the internal GNSS receiver COM2 Rx so differential correction data can be sent to the internal GNSS receiver for real time RTK. Please note that in this mode, the PORT D Tx is sill connected to the GPS 1 Tx signal.
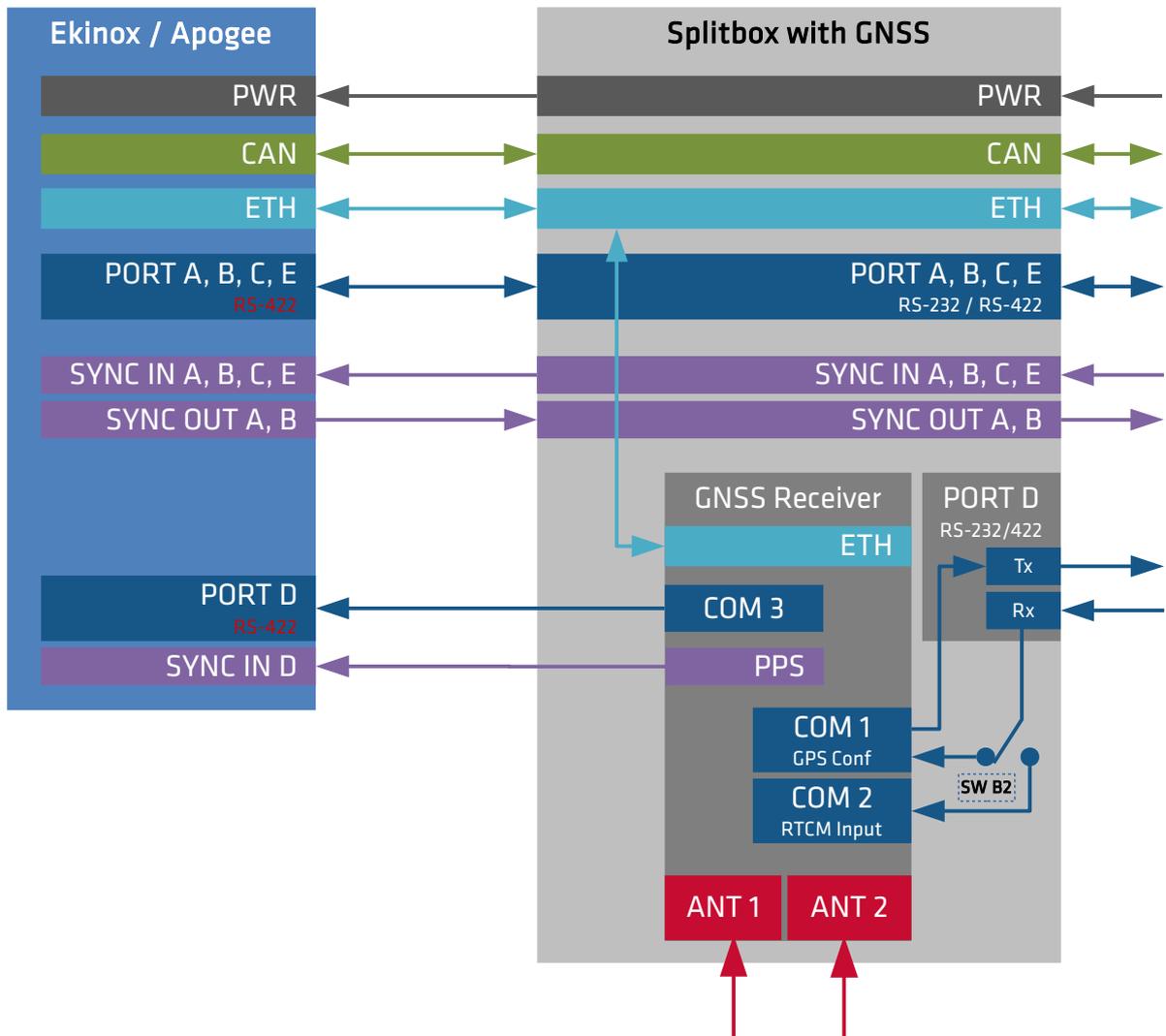
Figure 2.2: SplitBox with GNSS connection diagram

> **Note:** Whatever the PORT D function is, the PORT D Tx is always connected to the internal GNSS receiver COM 1. This is very useful if you would like to use the PORT D to input RTCM corrections while sending GGA frames @ 1 Hz from the GNSS receiver.

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3. Internal GNSS receiver configuration

The embedded GNSS receiver is shipped with a pre-configuration that allows easy connection to the Ekinox / Apogee.

- Ethernet interface is configured in DHCP mode
- COM 1 is set to 115 200 bps (Used for external configuration through Splitbox PORT D)
- COM 2 is set to 38 400bps and accepts RTCM input
- COM 3 is set to 460 800 bps for GPS data input to Ekinox / Apogee)
- PPS Signal is sent at 1Hz, with a Rising Edge polarity.

> **Note:** For more details about how to interface a Septentrio or Trimble GNSS receiver with the Ekinox and Apogee series, please refer to the Septentrio and Trimble Integration Operating Handbooks.

4. Interface

This section describes the different connectors and indicators available on the SplitBox.

4.1. Front face

This face brings one connector for each port of the Ekinox / Apogee. The Ethernet, PORT A, B, C, E, and CAN connectors are linked to their Ekinox/Apogee counterparts.

The PORT D has a different function depending on the SplitBox model. For the one without an internal GNSS receiver, the PORT D is directly connected to the Ekinox/Apogee but for the SplitBox with an integrated GNSS receiver, the PORT D is either used to input RTCM corrections or to have a direct full duplex serial link to the internal GNSS receiver.

Finally, the front face also provides an easy access two SMA connectors for Sync In A (right) and Sync Out B (left). Sync In signals are used to time stamp data such as a PPS input signal from an external GNSS receiver or for event markers. The Sync Out is generally used to output a PPS signal to third part equipment.

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4.2. Back face

The back face includes the connectors to connect the Ekinox/Apogee to the SplitBox as well as a DC input, to provide power to the SplitBox and the Ekinox/Apoge.

A master power switch controls the whole system power supply. On the bottom right corner, an eight ways configuration switch is used to change the SplitBox behavior.

Finally for SplitBox with an internal GNSS receiver, the Main and Secondary GNSS antennas can be connected using standard TNC connectors.

4.2.1. Version Standard (STD)

On the standard version, 3 cables are used to connect the SplitBox to the Ekinox/Apogee.

4.2.2. Version Subsea (SUB)

On the Subsea version one single cable is used to connect the SplitBox to the subsea Ekinox.

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4.3. Status LED Description

Those LEDS inform you about the GNSS receiver function as well as general status display.

4.3.1. Power LED

This LED turns red when the SplitBox is powered on.

4.3.2. Satellite LED

The main behavior of this led is: green when the GNSS board has a valid position and red when entering RTK mode.

4.3.3. Sync Out LED

This LED reflects the signal present on the Sync Out B.

> **Note:** Please not that the default Sync Out B signal level is HIGH. If no Sync Out B signal is configured on the Ekinox/Apogee or at startup, the signal level will thus be HIGH.

4.3.4. Network LED

The Network LED reflects the status of the Ethernet Link between the SplitBox and the user's network. It turns green when a link is established and yellow when data is being transferred.

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4.4. Configuration Switches

The configuration switches are present on the back face of the SplitBox enclosure. They are used to change the protocol mode between RS-232 and RS-422 for the serial Port A, B, C, D and E. The SplitBox behavior can be further customized to customer specifics needs as described below.
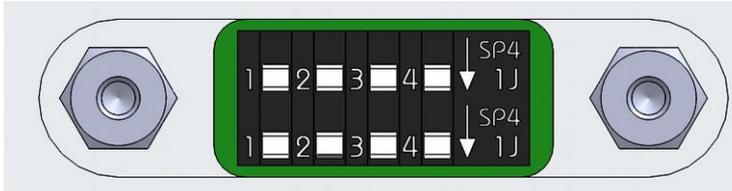
Switch Position	Function	Switch UP	Switch DOWN	Comment
Top Row (T)				
1	Port A Protocol	**RS-232**	RS-422	
2	Port B Protocol	**RS-232**	RS-422	
3	Port C Protocol	**RS-232**	RS-422	
4	Port D Protocol	**RS-232**	RS-422	
Bottom Row (B)				
1	Port E Protocol	**RS-232**	RS-422	
2	Port D Function	GPS Config	**RTCM Input**	Only relevant for versions with internal GNSS
3	Port D / Port E Power output	ON	**OFF**	Useful to supply power to an external equipment such as radio or an odometer.
4	Sync Out Voltage	3.3V	**5V**	

> ⓘ **Note:** The factory default configuration is indicated in bold.

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5. Mechanical specifications

5.1. Overview

Parameter	Specification
Size	STD: 190.4 x 159.3 x 58 mm (7.5 x 6.3 x 2.3 "), including connectors SUB : 190.4 x 162.9 x 58 mm (7.5 x 6.42 x 2.3 "), including connectors
Weight	STD: 1310g STD-S: 1420g STD-T: 1435g SUB: 1310g SUB-S: 1420g SUB-T: 1435g
Enclosure	Extruded Aluminum & Die-casted Zinc alloy
IP Rating	IP65
Operating temperature	-40 to 75°C (-40 to 167°F)
Storage temperature	-40 to 85°C (-40 to 185°F)
Humidity	95% relative humidity, non condensing

5.2. Mechanical outline

5.2.1. Front view
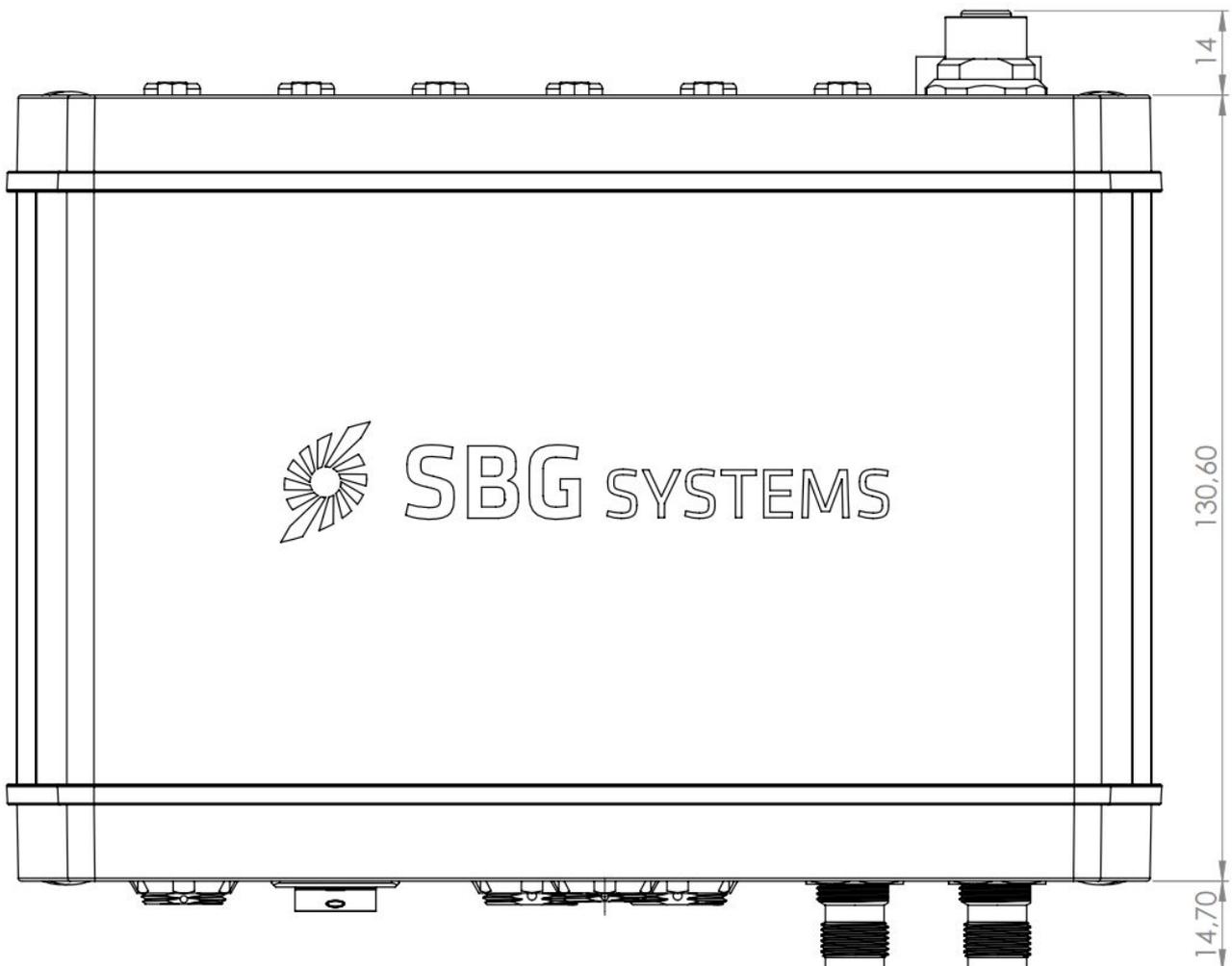
5.2.3. Back view

5.2.3.1. Version Standard (STD)
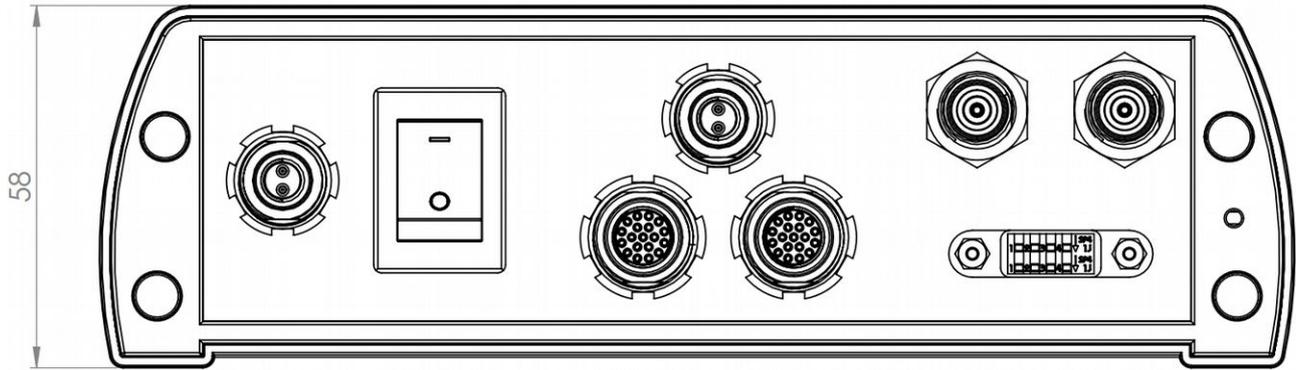
5.2.3.2. Version Subsea (SUB)
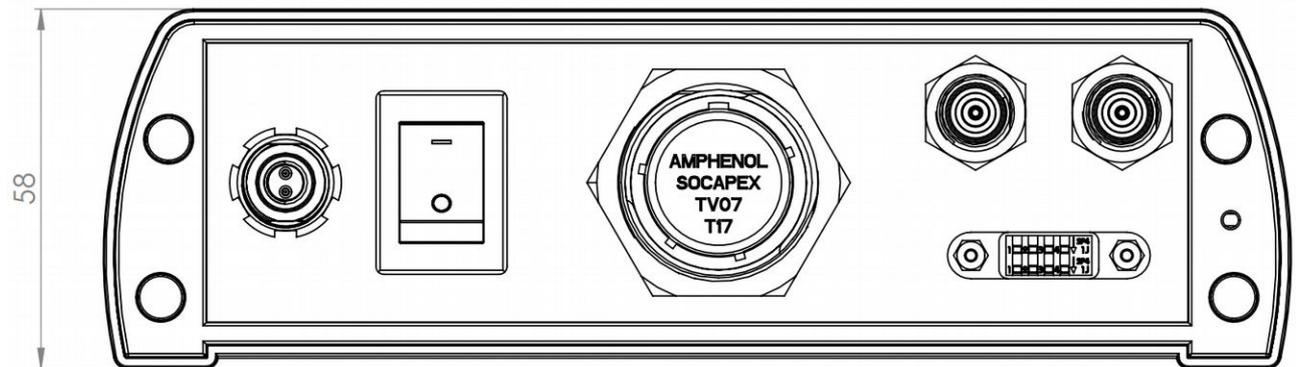
6. Electrical Specifications

6.1. Power Electrical Specifications

Parameter	Min.	Typ.	Max.	Units	Conditions
Operating Voltage	9	12	36	VDC	
Power Consumption @ 12V		2.4 4.8 5.5		W	STD, SUB STD-T, SUB-T STD-S, SUB-S
In-Rush Current		TBD			
Allowable Input Voltage Variation (dv/dt)			5	V / ms	
Under voltage lock out	9 8			V V	Turn on threshold
Reflected ripple current					Turn off threshold
Switching frequency	400			kHz	
Galvanic isolation			± 200	VDC	VIN+ to Mechanical Ground VIN- to Mechanical Ground

6.2. I/O Electrical Specifications

Parameter	Min.	Typ.	Max.	Units	Conditions
Port A, B, C, D, E - Sync In					
Input Voltage Range	-25		+25	V	
Input Threshold	0.8	1.5 1.8	2.7	V V	Threshold Low Threshold High
Input Hysteresis		TBD			
Input Resistance			5	V / ms	
ESD Protection	9 8			V V	Turn on threshold
Sync Out A, Sync Out B					
Output Type	Open-Drain with integrated Pull-Up Resistors				
High-level Output Voltage	3.3		5	V	Selectable via configuration switch
Low-level Output Voltage		0.25	0.4	V	
Low-level Output Current			40	mA	
ESD Protection	±15			kV	Human Body Model
CAN					
Directly wired to the INS. Refer to the INS datasheet for more information					
Receiver Data Rate	4800		921600	bps	
Input Resistance	48			kOhm	-7V < Common Mode Voltage <

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					+12V
Input Current			-0.15	mA	Common Mode Voltage = -7V
			0.25	mA	Common Mode Voltage = +12V
Input Differential Threshold	-200		-50	mV	-7V < Common Mode Voltage < +12V
Input Hysteresis		30		mV	
ESD Protection	±15			kV	Human Body Model

Port A, B, C, D - RS-422 Transmitter

Transmitter Data Rate	4800		921600	bps	
Transmitter Rise & Fall Time		10	25	ns	
Differential Output Voltage		2		V	
Change in Magnitude of Differential Output Voltage for Complementary Output States			0.2	V	
Common-Mode Output Voltage			3	V	
Change in Magnitude of Common-Mode Output Voltage for Complementary Output States			0.2	V	
Output Short-circuit Current			±250	mA	-7V < TX+ or TX- < +12V
ESD Protection	±15			kV	Human Body Model

Port A, B, C, D, E - RS-232 Receiver

Receiver Data Rate	4800		921600	bps	
Input Voltage Range	-25		+25	V	
Input Threshold	0.8			V	Threshold Low
			2.0	V	Threshold High
Input Hysteresis		500		mV	
Input Resistance	3	5	7	kOhm	
ESD Protection	±15			kV	Human Body Model

Port A, B, C, D - RS-232 Transmitter

Transmitter Data Rate	4800		921600	bps	
Transistion-Region Slew Rate	13		150	V/µs	
Output Voltage Swing	±5	±5.4		V	
Output Short-Circuit Current		±30	±60	mA	Tx = GND
ESD Protection	±15			kV	Human Body Model

PORT D, E Power Output

Output Voltage		12		V	
Output Current			0.4	A	Short-Circuit Protected with Auto-Retry
ESD Protection	±15			kV	Human Body Model

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7. Connectors pin-outs

On the following tables, pins that are not used are not specified.

7.1. Front face

7.1.1. Ethernet

This is a standard M-12 connector.

Pin #	Name	Description
1	Tx+	Ethernet TX+ Signal
2	Rx+	Ethernet RX+ Signal
3	Tx-	Ethernet TX- Signal
6	Rx-	Ethernet RX- Signal
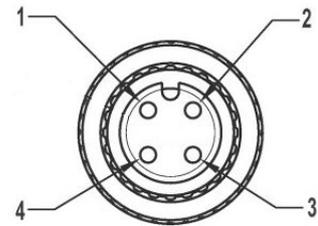
7.1.2. CAN

The CAN interface is accessed using a standard DB-9 connector. There is no termination resistor between CAN_L and CAN_H.

Pin #	Name	Description
2	CAN_L	CAN bus 2.0 low line
3	GND	
7	CAN_H	CAN bus 2.0 high line
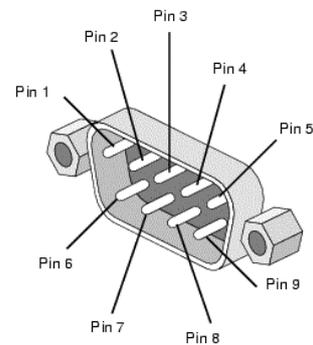
7.1.3. Port A

This full duplex PORT A can either be configured in RS-232 or RS-422 mode through configuration switches. The Sync Out A TTL signal level could be 3.3V or 5V according to configuration switches.

Pin #	RS-232	RS-422	Direction	Description
2	Rx	Rx+	In	
3	Tx	Tx-	Out	
4	Sync Out A	Sync Out A	Out	3.3V or 5V TTL output for synchronization output signal such as PPS
5	GND	GND	-	Ground return
6	NA	Rx-	In	
7	NA	Tx+	Out	

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7.1.4. Port B, C

These full duplex serial ports can be individual configured in RS-232 or RS-422 mode through configuration switches.

Pin #	RS-232	RS-422	Direction	Description
1	Sync In	Sync In	In	Sync In Signal (GPS PPS for example)
2	Rx	Rx+	In	
3	Tx	Tx-	Out	
5	GND	GND		Ground return
6	NA	Rx-	In	
7	NA	Tx+	Out	

7.1.5. Port D

7.1.5.1. SplitBox without integrated GNSS

Input only serial port that can be configured in RS-232 or RS-422 mode through configuration switches.

Pin #	RS-232	RS-422	Direction	Description
1	Sync In	Sync In	In	Sync In Signal (GPS PPS for example)
2	Rx	Rx+	In	
4	PWR	PWR	Out	+12V output to provide power to a third party equipment such as a radio modem (selectable via configuration switch)
5	GND	GND		Ground return
6	NA	Rx-	In	

7.1.5.2. SplitBox with GNSS (RTCM input / GPS configuration)

Special serial port used to input RTCM corrections or to get a direct full duplex connection to the internal GNSS receiver. It can be configured in RS-232 or RS-422 mode through configuration switches.

Pin #	RS-232	RS-422	Direction	Description
2	Rx	Rx+	In	Connected to the internal GNSS COM1 or COM3 port (selectable via configuration switch)
3	Tx	Tx-	Out	Directly connected to the internal GNSS COM1 port
4	PWR	PWR	Out	+12V output to provide power to a third party equipment such as a radio modem (selectable via configuration switch)
5	GND	GND		Ground return
6	NA	Rx-	In	Connected to the internal GNSS COM1 or COM3 port (selectable via configuration switch) - RS-422 only
7	NA	Tx+	Out	Directly connected to the internal GNSS COM1 port - RS-422 only

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7.1.6. Port E

Input only serial port that can be configured in RS-232 or RS-422 mode through configuration switches.

Pin #	RS-232	RS-422	Direction	Description
1	Sync In	Sync In	In	Sync In Signal (GPS PPS for example)
2	Rx	Rx+	In	
4	PWR	PWR	Out	+12V output to provide power to a third party equipment such as an odometer (selectable via configuration switch)
5	GND	GND		Ground return
6	NA	Rx-	In	

7.1.7. Synchronizations – SMA connectors

Pin #	Signal	Direction	Description
1	Sync In A	In	Sync In Signal / PPS input
2	Sync Out B	Out	Sync Out B / PPS output – TTL 3.3V or 5V (selectable via configuration switch)

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7.2. Back face

The SplitBox back face is used to connect the Ekinox or the Apogee. It will have either 3 connectors for the STD version or one connector for SUB versions. In both cases there is also the *Power In* connector that will supply both the Split box and the Ekinox.

7.2.1. Power In

The connector is a Fischer Connectors Alulite receptacle similar to the one used on the Ekinox and Apogee devices.

Its reference is: AL1731-DBPU-103-Z051PB11-12G13

Pin #	Name	Description
Shield	Shield	Mechanical ground
1	Vin+	Power input
2	Vin-	Power ground

7.2.2. Standard SplitBox, Ekinox/Apogee connectors

7.2.2.1. Ekinox/Apogee Power Supply

The connector is a Fischer Connectors Alulite receptacle similar to the one used on the Ekinox and Apogee devices but with a reversed polarity for obvious safety reasons.

Its reference is: AL1731-DBPU-103-A051PB11-12G13

Pin #	Name	Description
Shield	Shield	Mechanical ground
1	Vin+	Power input
2	Vin-	Power ground

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7.2.2.2. Ekinox/Apogee Main

The connector used is a Fischer Connectors Alulite receptacle similar to the one used on the Ekinox and Apogee devices.

Its reference is: AL1731-DBPU-104-A092PB11-12G13

Pin #	Name	Description
Shield	Shield	Connected to the mechanical ground
1	GND	Connected to the main connector electrical ground
5	GND	Connected to the main connector electrical ground
7	GND	Connected to the main connector electrical ground
2	GND	Connected to GND to select RS-422 mode
3	Sync Out A	Synchronization output signal A
4	Sync Out B	Synchronization output signal B
6	Sync In A	Synchronization input signal A
8	Port A – RS-422 - Rx+	Port A serial input data / configuration RS-422
9	Port A – RS-422 - Rx-	Port A serial input data / configuration RS-422
10	Port A – RS-422 - Tx-	Port A serial output data / configuration RS-422
11	Port A – RS-422 - Tx+	Port A serial output data / configuration RS-422
14	CAN H	CAN bus 2.0 high line
15	CAN L	CAN bus 2.0 low line
16	Ethernet Tx+	Ethernet data link
17	Ethernet Tx-	Ethernet data link
18	Ethernet Rx-	Ethernet data link
19	Ethernet Rx+	Ethernet data link

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7.2.2.3. Ekinox/Apogee Auxiliary

The connector used is a Fischer Connectors Alulite receptacle similar to the one used on the Ekinox and Apogee devices.

Its reference is: AL1731-DBPU-104-A092PB12-12G13

Pin #	Name	Description
Shield	Shield	Connected to the mechanical ground
1	GND	Connected to the external connector electrical ground
5	GND	Connected to the external connector electrical ground
7	GND	Connected to the external connector electrical ground
4	Sync In B	Port B input synchronization
12	Port B – RS-422 – Rx+	Port B serial input RS-422
13	Port B – RS-422 – Rx-	Port B serial input RS-422
14	Port B – RS-422 – Tx+	Port B serial output RS-422
15	Port B – RS-422 – Tx-	Port B serial output RS-422
6	Sync In C	Port C input synchronization
16	Port C – RS-422 – Rx+	Port C serial input RS-422
17	Port C – RS-422 – Rx-	Port C serial input RS-422
18	Port C – RS-422 – Tx-	Port C serial output RS-422
19	Port C – RS-422 – Tx+	Port C serial output RS-422
2	Sync In D	Port D input synchronization
8	Port D – RS-422 – Rx+	Port D serial input RS-422
9	Port D – RS-422 – Rx-	Port D serial input RS-422
3	Sync In E	Port E input synchronization / Odometer B
10	Port E – RS-422 – Rx-	Port E serial input RS-422
11	Port E – RS-422 – Rx+	Port E serial input RS-422 / Odometer A

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7.2.3. Subsea SplitBox, Ekinox connector

The subsea SplitBox only has one connector to connect the SplitBox to the subsea Ekinox. This connector is an Amphenol MIL-DTL-38999 Series III receptacle.

Its reference is: TVS07FCI-17-35S.

Pin #	Name	Remarks
1	Ethernet Tx+	Ethernet data link
2	VIN+	Power input
3	Sync In E	Port E input synchronization
4	Ethernet Rx+	Ethernet data link
5	Ethernet Rx-	Ethernet data link
6	Ethernet Tx-	Ethernet data link
7	GND	Connected to the main connector electrical ground
8	GND	Connected to the main connector electrical ground
9	Sync In D	Port D input synchronization
10	Port A – RS-422 - Rx+	Port A serial input RS-422
11	Port A – RS-422 – Rx-	Port A serial input RS-422
12	GND	Connected to the main connector electrical ground
13	GND	Connected to the main connector electrical ground
14	GND	Connected to the main connector electrical ground
15	GND	Connected to the main connector electrical ground
16	Sync In B	Port B input synchronization
17	Port A – RS-422 – Tx-	Port A serial output RS-422
18	Port A – RS-422 - Tx+	Port A serial output RS-422
19	GND	Connected to the main connector electrical ground
20	GND	Connected to the main connector electrical ground
21	GND	Connected to the main connector electrical ground
22	GND	Connected to the main connector electrical ground
23	GND	Connected to the main connector electrical ground
24	Sync In A	Port A input synchronization
25	GND	Connected to the main connector electrical ground
26	GND	Connected to the main connector electrical ground
27	GND	Connected to the main connector electrical ground
28	GND	Connected to the main connector electrical ground
29	GND	Connected to the main connector electrical ground
30	GND	Connected to the main connector electrical ground
31	GND	Connected to the main connector electrical ground
32	Port B - RS-422 - Rx+	Port B serial input RS-422
33	Port B - RS-422 - Rx-	Port B serial input RS-422

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Pin #	Name	Remarks
34	GND	Connected to the main connector electrical ground
35	GND	Connected to the main connector electrical ground
36	GND	Connected to the main connector electrical ground
37	GND	Connected to the main connector electrical ground
38	GND	Connected to the main connector electrical ground
39	Sync Out B	Port B output synchronization
40	Port B – RS-422 - Tx+	Port B serial output RS-422
41	Port B – RS-422 – Tx-	Port B serial output RS-422
42	GND	Connected to the main connector electrical ground
43	GND	Connected to the main connector electrical ground
44	GND	Connected to the main connector electrical ground
45	GND	Connected to the main connector electrical ground
46	Sync Out A	Port A output synchronization
47	Port C - RS-422 – Rx-	Port C serial input RS-422
48	Port C - RS-422 - Rx+	Port C serial input RS-422
49	Port C - RS-422 – Tx-	Port C serial output RS-422
50	Port D - RS-422 - Rx+	Port D serial input RS-422
51	Port E - RS-422 – Rx-	Port E serial input RS-422
52	Port E - RS-422 - Rx-	Port E serial input RS-422
53	Port C - RS-422 - Tx+	Port C serial output RS-422
54	VIN-	Power ground
55	Port D – RS-422 – Rx-	Port D serial input RS-422

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8. Support

Our goal is to provide the best experience to our customers. If you have any question, comment or problem with the use of your product, we would be glad to help you, so feel free to contact us:

EMEA:

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9. Appendix A: Accessories

9.1. Cables

9.1.1. CA-AEK-PWR-PSU-1.5M

This cable is an international AC/DC adapter to power up the Ekinox or the SplitBox.

- 110 / 250 V input with UK, US and EU plugs.
- 12V output
- 1.5m long cable
- No IP rating

Figure 9.1 : AC / DC power adapter

9.1.2. CA-AEK-PWR-3M

This cable mates with the POWER connector to power up the Ekinox or the SplitBox from external power supply.

- 1 x Fischer Core Series S-103-Z051-130 connector
- 1 x open end
- IP-68 rating
- 3m long AWG 18 cable
- Weight: 170g

Figure 9.2 : Alternative Power cable

Cable wiring is:

Pin	Signal	Color
SHIELD	NC	SHIELD
1	V+	Red
2	V-	Black

9.1.3. CA-AEK-PWR-SB-5M

Cable used to connect the POWER connectors from a surface SplitBox to a surface Ekinox or Apogee.

- 1 x Fischer Core Series S-103-A051-130 connector
- 1 x Fischer Core Series S-103-Z051-130 connector
- IP-68 rating
- 5 m long AWG 18 cable
- Weight: 280g

Figure 9.3 : CA-AEK-PWR-SB-5M cable

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9.1.4. CA-AEK-MAIN-SB-5M

Cable used to connect the MAIN connectors from a surface SplitBox to a surface Ekinox or Apogee.

- 2 x Fischer Core Series S-104-A092-130
- IP-68 rating
- 5 m AWG26 shielded cable with twisted pairs
- Weight: 500g

Figure 9.4 : CA-AEK-MAIN-SB-5M cable

9.1.5. CA-AEK-AUX-SB-5M

Cable used to connect the AUX connectors from a surface SplitBox to a surface Ekinox or Apogee.

- 2 x Fischer Core Series S-104-A092-230
- IP-68 rating
- 3 m AWG26 shielded cable with twisted pairs
- Weight: 500g

Figure 9.5 : CA-AEK-AUX-SB-5M cable

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9.1.6. CA-AEK-SUB-SB-10M, CA-AEK-SUB-SB-20M

10 or 20 meters sub sea cable used to connect a subsea SplitBox with a subsea Ekinox.

9.1.6.1. Cable Construction

This high quality subsea cable has a Amphenol, TVS06RF-17-35PN-USBSB3 connector on one side and a Seacon MINIM-37#22-CCP-Ti connector over-moulded on the other side. The 37 ways Seacon connector is made of Titanium perfectly compatible with the Ekinox housing to ensure minimal degradation during long time immersions in salt water.

Figure 9.6 : CA-AEK-SUB-SB-10M

9.1.6.2. Electrical characteristics

General Minimum Insulation Resistance	Rating
Core to Core	> 900 MΩ/km @ 500 V
Core to Screen	> 500 MΩ/km @ 500 V
Screen to Screen	> 10 MΩ/km @ 500 V
26 AWG Screen Twisted Paris (Signals)	
Nominal Conductor Resistance	181.10 Ω/km @ 20 °C
Nominal Impedance	100 Ω
Nominal Capacitance	84 pF/m
22 AWG Conductors (Power Supply)	
Nominal Conductor Resistance	59.30 Ω/km @ 20 °C
Max Recommended Voltage	500 V

9.1.6.3. Mechanical characteristics

Temperature characteristics Limits	Rating
Static Operating Temperature	+90 °C
Dynamic Operating Temperature	+80 °C
Cold Flex Temperature	-40 °C
Mechanical characteristics	
Cable Length	10 / 20 meters
Cable Diameter	17 mm ± 0.30 mm
Depth Rating	500 meters
Weight In Air	267 kg/km
Weight In Sea Water	34 kg/km @ SG 1.025
Recommended Bend Radius Limits	
Static	85 mm
Dynamic	160 mm

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9.2. GPS accessories

9.2.1. GNSS antennas

The following GPS antennas are recommended for SplitBox with integrated GNSS receiver operations:

Product code	Description	Photo
ANT-SEP-POLANT-MC	Survey grade, geodetic antenna L1 / L2 / L5, L-Band GPS, GLONASS, GALILEO, Beidou Pole Mount – TNC Connector Excellent multipath rejection *Dimensions*: Ø146mm ; h=62.5mm *Weight*: 420g	

9.2.2. TNC Cables

The following TNC cables can be ordered to connect the SplitBox with integrated GNSS to a GNSS antenna:

Product code	Length – Remarks
CA-TNC-MM-RG223-3M	3 m - flexible cable *Weight*: 190g
CA-TNC-MM-RG223-5M	5 m - flexible cable *Weight*: 280g
CA-TNC-MM-LMR240-10M	10 m – low-loss cable *Weight*: 520g
CA-TNC-MM-LMR240-30M	30 m – low-loss cable *Weight*: approx 1500g

Figure 9.7 : TNC cable

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