ASL
Avalon Sciences Ltd
LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

DOWNHOLE

Downhole Ancillaries

Avalon Sciences Ltd

SINK-1 – Roller Sinker Bar (Ancillary)

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- Robust Sinker Bar.
- Compatible use with VRS.
- Motion Sensor.
- Can be used with both.
- Digital and Analogue.
- Geochain configurations.
- Multiple Sinker Bars can be joined together.
- Very Low Maintenance.
- High Pressure.
- High Temperature.

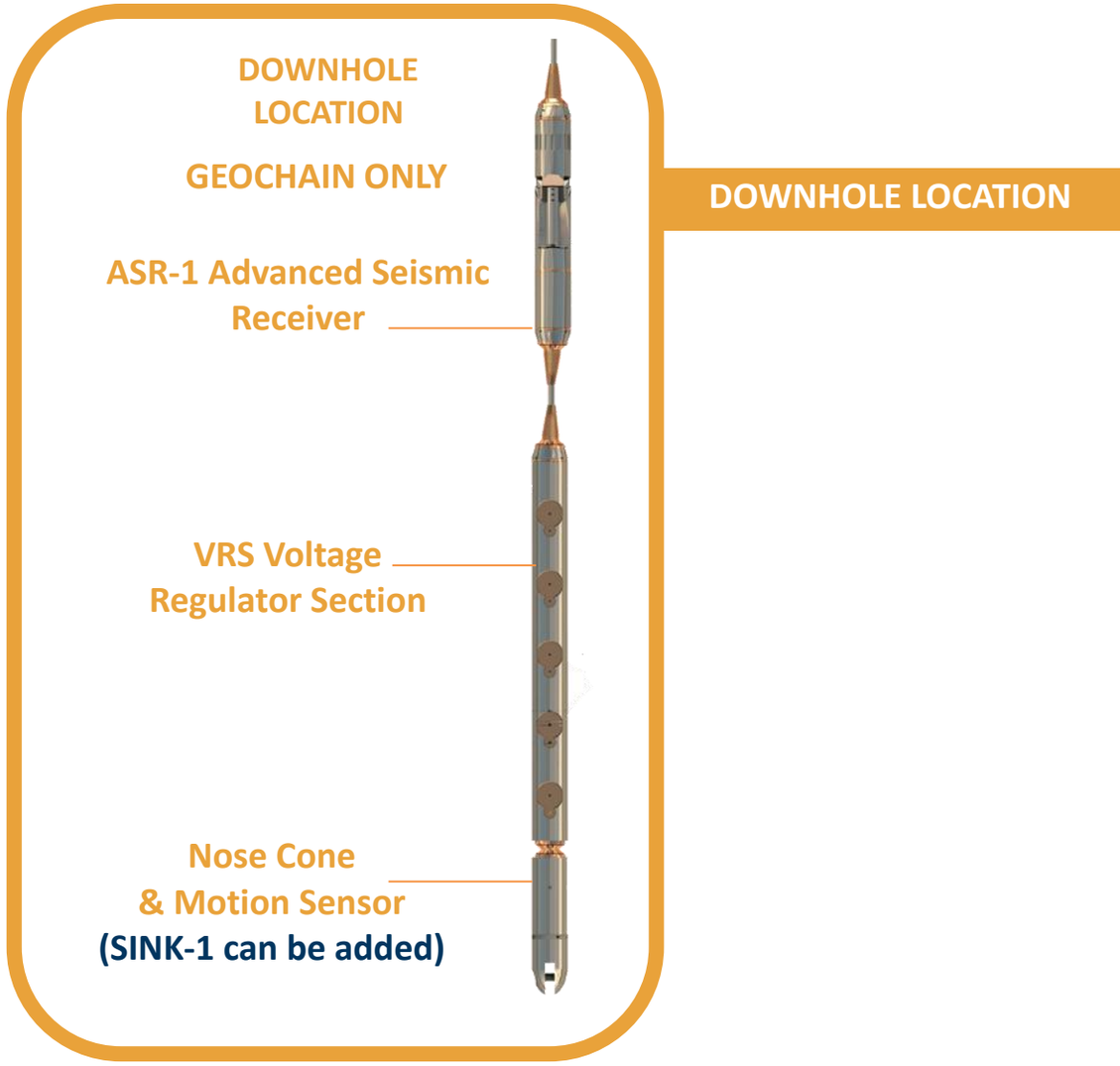
Functionality

- The SINK-1 Roller Sinker Bar is located at the bottom end of the GeochainTM digital/ASR-1 Analogue receiver array and serves as a sinker weight.
- When used with the digital Geochain™ system the sinker is able to couple directly below the VRS motion sensor ensuring full string monitoring functionality when lowering receivers into the well. Multiple sinker bars can be joined together to give a greater sink weight.
- Containing no additional internal electronics the SINK-1 is a very low maintenance device and can perform within the harshest of well environments.

Compatible with

GEO

Geochain Analogue and Digital



DOWNHOLE LOCATION

SINK-1 Satellite Specifications	
Length	53.6” (1363mm)
Diameter	3” (76mm)
Weight	88lbs (40kg)
Temperature	401°F (205°C) *Digital Only
Pressure	25,000psi (1750 bar) version
Interface	VRS/ASR-1/ASR-1 EHP
Nose Cone	ASR 89

Compatible with Geochain EHP but limits system to 25,000 PSI operation

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Geochain Inter-Tool Cable HP

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- Standard 7 conductor wireline.
- Up to >600ft (200m) tool separation.
- 25,000psi (1750 bar) pressure rating.
- Max weaklink setting 15,492 lbs (69 kN).

Functionality

- The ITC modular connecting system allows the deployment of multiple Geochain™ tools in a deviated or vertical well.
- The cable is flexible such that the Geochain tools can be deployed into a deviated well.
- Weaklink screws are located on the lower head of the ITC. In the event of a stuck string, the weak links can be pulled such that the system can be easily fished.

Specifications	*ITC-HP*
Separation Length	Up to 600 ft (200m) per section
Cable Head Diameter	3” (76mm)
Temperature	400°F (205°C)
Pressure	25,000 psi (1750 bar)
Weight	50ft-39lbs 100ft-58lbs
Cable Specifications	
Cable Type	Slammer
Cable Weight	392 lb/kft (583 kg/km)
Outer Diameter	0.475” (12.04mm)
Breaking Strength	109kN (24,500 lbf)
Weak Link Specifications	
Weak Link Screw size	A to W
Load	Up to 17.228 N (3,873lbf)

Compatible with

GEO

Geochain Analogue and Digital

Weak Link Screw Size	Diameter (mm)	Load (kN)	Load (lbf)	**Load Capacity of cable head lbs *(kN)***	**Weak Link Screw Size**	Diameter (mm)	Load (kN)	Load (lbf)	**Load Capacity of cable head lbs *(kN)***
A	3.5	6.8	1531	**6124 (27)**	**L**	4.6	12	2695	**10780 (48)**
B	3.6	7.2	1629	**6516 (29)**	**M**	4.7	12.8	2883	**11532 (51)**
C	3.7	7.8	1754	**7016 (31)**	**N**	4.8	12.9	2899	**11596 (52)**
D	3.8	8.1	1831	**7324 (32)**	**O**	4.9	13.4	3010	**12040 (54)**
E	3.9	8.3	1883	**7532 (33)**	**P**	5	13.9	3119	**12476 (56)**
F	4	8.9	2003	**8012 (36)**	**R**	5.1	14.6	3288	**13152 (58)**
G	4.1	9.3	2084	**8336 (37)**	**S**	5.2	15.6	3506	**14024 (62)**
H	4.2	9.9	2229	**8916 (40**	**T**	5.3	15.8	3546	**14184 (63)**
I	4.3	10.3	2311	**9244 (41)**	**U**	5.4	16.1	3637	**14548 (64)**
J	4.4	10.7	2405	**9620 (43)**	**V**	5.5	16.7	3756	**15024 (67)**
K	4.5	11.7	2620	**10480 (47)**	**W**	5.6	17.2	3873	**15492 (69)**

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Geochain Rigid Inter-Tool Cable - RITC

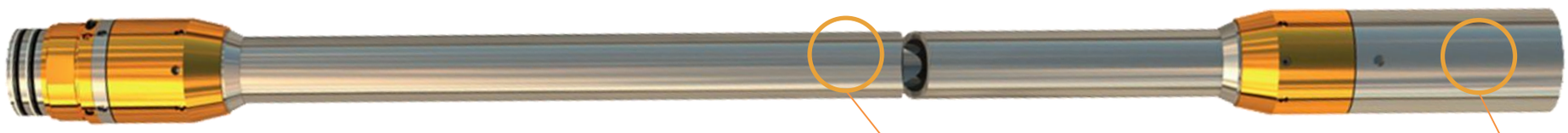
DOWNHOLE

Main Features

- Rigid connection between satellites
- Preserves receiver orientation
- The wiring between cable heads is enclosed in an armour casing, designed for hostile well environments.
- Standard 7 conductor
- Up to >50’ (15m) tool separation (25ft per RITC).
- 20,000psi (1400 bar) pressure rating.
- Capable of holding up to 10,000 lbf (44482 N)
- Knuckle joints available for well deviation.

Functionality

- The RITC is a modular rigid connecting system for use with analogue or digital Geochain tools. It allows the tools to be deployed in highly deviated or horizontal wells with precise alignment of all the locking arms.
- The connection can be totally rigid by using just male to female RITC sections or knuckle joints can be used to provide flexibility. A single knuckle joint can be used or a pair fitted above and below the rigid section. The RITC-05 has an in line connection allowing stacking to increase the tool separation.



- Larger spacing can be achieved by connecting multiple RITC 31 with a long female to female coupler (RITC 47) in the between each RITC 31.
- Alternative Female/Male connections available.

Compatible with

GEO

Geochain Analogue and Digital (EHP & Slim variant available)

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Specifications	*RITC-31*	*RITC -47 (F-F Coupler)*
Separation Length	Up to 25 ft per section	Female-Female Coupler gives 50ft spacing with x2 RITC 31
	Multiple RITC coupled to give max 200’ separation.	
Cable Head Diameter	3” (76mm)	3” (76mm)
Temperature	400°F (205°C)	400F (205°C)
Pressure	20,000 psi / 1400 bar	20,000 psi / 1400 bar
Cable Specifications		
Cable Type	7-conductor within pressure housing	
RITC Weight - 25ft	133 lbs (60.4 kg)	35.3 lbs (16 kg)
Load	Up to 10,000 lbf (44482 N)	
Weak Link Specifications	No Weak Links	

Male-Male 25ft ASR-1 & ASR-1 HP Interconnect 7-conductor

Female-Female (RITC-47) coupler to connect x2 25ft RITC to give 50ft receiver spacing

Avalon Sciences Ltd

Geochain Slim Inter-Tool Cable

DOWNHOLE

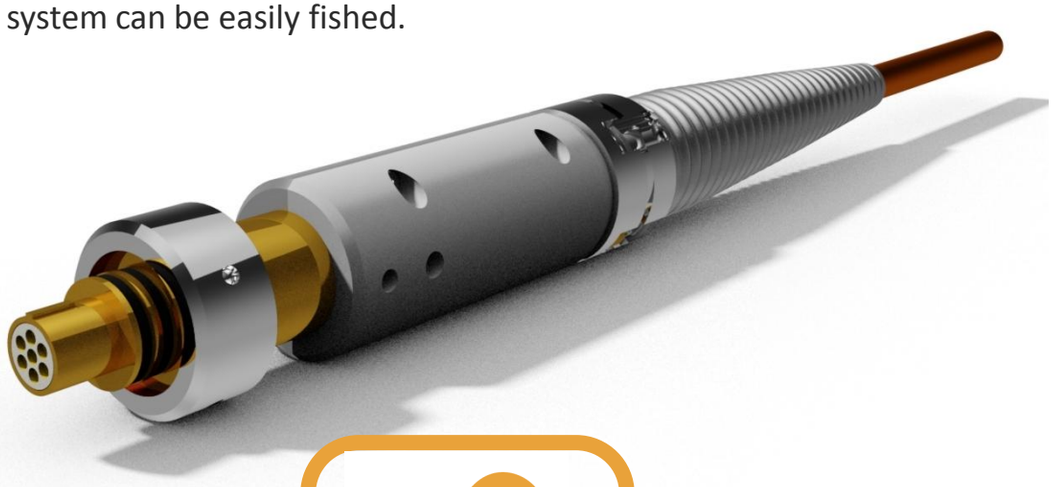
LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- Standard 7 conductor wireline with GO7 connection.
- Up to >600’ (200m) tool separation.
- 20,000psi (1400 bar) pressure rating.
- Capable of holding up to 8108 lbf (36 kN) load.

Functionality

- The ITC modular connecting system allows the deployment of multiple Geochain Slim tools in a deviated or vertical well.
- The cable is flexible such that the Geochain Slim tools can be deployed into a deviated well.
- Weaklinks screws are located on the lower head of the Slim ITC. In the event of a stuck string, the weak links can be pulled such that the system can be easily fished.



Compatible with

SLIM

GeochainSlim

Specifications	***SITC***
Separation Length	Up to 200 ft (61m) per section
Cable Head Diameter	1 11/16” (43mm)
Temperature	400°F (205°C)
Pressure	20,000 psi (1400 bar)

Cable Specifications	
Cable Type	Slammer Wireline
Cable Weight	392 lb/kft (583 kg/km)
Outer Diameter	0.475” (12.04mm)
Breaking Strength	109kN (24,500 lbf)

Weak Link Specifications	
Weak Link Screw size	3.0 to 3.5 mm
Load	Up to 2,027 lbf (9016 N)

Screw Size (mm)	***Load (N)***	***Load (lbf)***	***Lbf 2x screws***	***Lbf 3x screws***	***Lbf 4x screws***
3	5936	1334	2669	4003	5337
3.1	6860	1549	3098	4646	6195
3.2	7402	1664	3328	4992	6656
3.3	7749	1742	3484	5226	6968
3.4	8425	1894	3788	5982	7576
3.5	9016	2027	4054	6081	8108

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Avalon Sciences Ltd

Geochain Slim Rigid Inter-Tool Cable

DOWNHOLE

Main Features

- Standard 7 conductor wireline with GO7 connection.
- The wiring between cable heads is enclosed in an Armour casing, designed for hostile well environments.
- Larger spacing can be achieved by connecting multiple RITC 31 with a long female to female coupler (RITC 40) in between each RITC 31.
- Up to >50’ (15m) tool separation (25ft per RITC).

Functionality

- The SRITC is a modular rigid connecting system for use with analogue or digital Geochain tools. It allows the tools to be deployed in highly deviated or horizontal wells with precise alignment of all the locking arms.
- A knuckle joints can be used to provide flexibility. A single knuckle joint can be used or a pair fitted above and below the rigid section.

Specifications	***RITC 37***	***RITC 40 (Coupler)***
Length	262.4’’ (6664mm)	34.96” (888mm)
Cable Head Diameter	1 11/16” (43mm)	1 11/16” (43mm)
Temperature	400°F (205°C)	400°F (205°C)
Pressure	20,000 psi (1400 bar)	20,000 psi (1400 bar)
Weight		

Weak Link Specifications No Weak Links

Compatible with

SLIM
GeochainSlim

Avalon Sciences Ltd

Geochain Inter-Tool Cable EHP

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

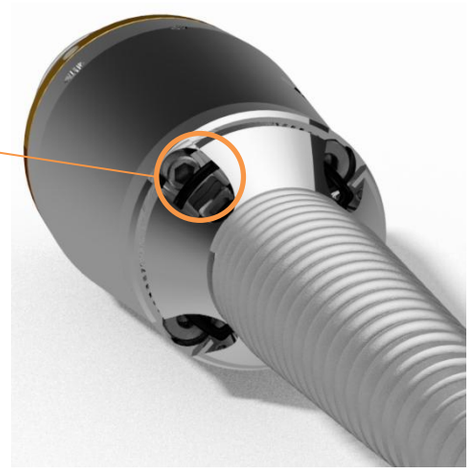
Main Features

- Standard 7 conductor wireline
- Up to 600’ (200m) tool separation
- 30,000psi (2100 bar) pressure rating
- Max weak link setting 15,492 lbs

Functionality

- The ITC modular connecting system allows the deployment of multiple Geochain EHP tools in a deviated or vertical well.
- The cable is flexible such that the Geochain EHP tools can be deployed into a deviated well.
- Weaklinks screws are located on the lower head of the ITC. In the event of a stuck string, the weak links can be pulled such that the system can be easily fished.

Specifications	***ITC-HP***
Separation Length	Up to 600ft (200m) per section
Cable Head Diameter	3.25” (83mm)
Temperature	400°F (205°C)
Pressure	30,000 psi (2100 bar)
Cable Specifications	
Cable Type	Slammer
Cable Weight	392lbs/kft (583kg/km)
Outer Diameter	0.475” (12.04mm)
Breaking Strength	24,500 lbf (109kN)
Weak Link Specifications	
Weak Link Screw size	A to W
Load	Up to 17.228 N (3,873lbf)



Compatible with

EHP
Geochain EHP

Weak Link Screw Size	*Diameter (mm)*	*Load (kN)*	*Load (lbf)*	***Load Capacity of cable head lbs** (kN)*	***Weak Link Screw Size***	*Diameter (mm)*	*Load (kN)*	*Load (lbf)*	***Load Capacity of cable head lbs** (kN)*
A	3.5	6.8	1,531	**6124** (27)	**L**	4.6	12	2,695	**10780** (48)
B	3.6	7.2	1,629	**6516** (29)	**M**	4.7	12.8	2,883	**11532** (51)
C	3.7	7.8	1,754	**7016** (31)	**N**	4.8	12.9	2,899	**11596** (52)
D	3.8	8.1	1,831	**7324** (32)	**O**	4.9	13.4	3,010	**12040** (54)
E	3.9	8.3	1,883	**7532** (33)	**P**	5	13.9	3,119	**12476** (56)
F	4	8.9	2,003	**8012** (36)	**R**	5.1	14.6	3,288	**13152** (58)
G	4.1	9.3	2,084	**8336** (37)	**S**	5.2	15.6	3,506	**14024** (62)
H	4.2	9.9	2,229	**8916** (40	**T**	5.3	15.8	3,546	**14184** (63)
I	4.3	10.3	2,311	**9244** (41)	**U**	5.4	16.1	3,637	**14548** (64)
J	4.4	10.7	2,405	**9620** (43)	**V**	5.5	16.7	3,756	**15024** (67)
K	4.5	11.7	2,620	**10480** (47)	**W**	5.6	17.2	3,873	**15492** (69)

Avalon Sciences Ltd

SHT-1 Downhole Swivel Tool

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- Allows rotation of a Geochain system to prevent induced torque into the system
- Rotates when exposed to >5 N/m imposed torque
- 25,000 psi pressure rating
- 225°C maximum operating temperature.

Functionality

- Designed to be positioned at the top of a Geochain System, the swivel tool allows rotation and prevents torque in the Geochain system
- The swivel tool is compatible with standard and rigid ITCs and capable of withstanding compression/ extension forces up to 5 tons.

Swivel Tool Specifications

Length	25.9” (657mm)
Diameter	3” (76mm)
Weight	5.7lbs (2.6kg)
Temperature	437°F (225°C)
Pressure	25000 psi (1724 bar)

DOWNHOLE LOCATION

GEOCHAIN ONLY

DOWNHOLE LOCATION

Compatible with

GEO

Geochain Analogue and Digital

Avalon Sciences Ltd

Geochain Maintenance Summary Datasheet

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

ASR-HP Maintenance

Minor Maintenance frequency	After ***every survey.***
Overview	Clean the tool, check nodes and arm spike for excessive wear
	Remove and replace all O rings
	Carry out a continuity and resistance test.
Major Maintenance frequency	• Once per year or once per 10 surveys whichever comes first • Whenever the tools have been run in a well with aggressive borehole fluid or high gas levels • Whenever the tools have been exposed to temperatures >150°C for >10 hours
Overview	Remove and replace all O rings
	Clean and inspect
	Continuity and resistance test.

TAS Maintenance

Minor Maintenance frequency	After ***every survey.***
Overview	Clean underneath barrel.
Major Maintenance frequency	Once per year or once per 10 surveys whichever comes first
Overview	Replace O rings
	Clean inside barrel and heatsink

ITC-HP Maintenance

Minor Maintenance frequency	After ***every survey.***
Overview	Check insulation and continuity. (conduct major maintenance if test fails)
	Clean head and replace O rings.
Major Maintenance frequency	• Once per year or once per 10 surveys whichever comes first • Whenever the cable have been run in a well with aggressive borehole fluid or high gas levels • Whenever the cable have been exposed to temperatures >150C for >10 hours
Overview	Disassemble head and clean out grease
	Clean and check connectors
	Fill cable head with fresh silicone grease.

VRS-HP Maintenance

Minor Maintenance frequency	After ***every survey.***
Overview	Replace all O rings
Major Maintenance frequency	• Once per year or once per 10 surveys whichever comes first • Whenever the tools have been run in a well with aggressive borehole fluid or high gas levels • Whenever the tools have been exposed to temperatures >150°C for >10 hours
Overview (includes minor maintenance)	Replace all O rings
	Inspect all the regulators and the through wiring.

GSP Maintenance

Instrument Testing	Automatically record a series of test files, testing the power distribution and open circuit tests. Should be carried out at the ***start of every survey***.

GPP Maintenance

Testing	Check WIB induction, should be tested before ***every survey.***
	Carry out a telemetry test within ACQ, before ***every survey.***

DCP-2 Maintenance

Self-Test	When turned on system performs a sequence that quickly checks for correct operation of the motor power and DHCC circuits.
Workshop testing	DCP-2 self-test is not exhaustive because there are no internal means to check the analogue signal circuits. Periodic workshop testing is required to fully check that your DCP-2 is working properly (***after every job***).

Disclaimer – This is not to be used as a manual for tool maintenance, please refer to the **Geochain Maintenance Manual** and **Geochain Preparation and Testing Manual** for all maintenance and testing procedures.

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DHH -2 Downhole Hydrophone

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- The DHH-2 downhole hydrophone is part of the GeochainSlim system. The DHH-2 is designed to fit anywhere within an analogue system. The tool utilises an inline GO-7 style coupling and can be used in conjunction with a gamma tool to provide depth correlation. The DHH-2 system can be modified to be tractor compatible.

Functionality

- Downhole hydrophones measure the acoustic noise of the fluid within the well. They can be used in a tool string to receive signals transmitted from the surface, to monitor seismic signals that create pressure waves in the well, or other such downhole monitoring.

- The DHH-2 is commonly used in Analogue tool strings and a digital version of the DHH-2 is in development. The DHH-2 uses up an equivalent GSR sensor pack VZ/HX/HY channel, thus allowing Gamma tools to be run in parallel using line 7.

Avalon Downhole hydrophone specification table

Specifications	***DHH-2***
Tool system	GSR
Length	25” (635mm)
Diameter	1 11/16” (43mm)
Weight	18lbs (8 kg)
Temperature	400°F (205°C)
Pressure	10,000 psi
Sensitivity	71 V/bar
Downhole Gain	20dB
Element	8.9 V/Bar
Frequency Response	10-1600Hz
Max Sample Rate	250 us
Coupling Type	Go-7

Compatible with

SLIM
GeochainSlim Digital

SURFACE PANELS

Recorder
GSP

Analogue Panel
DCP

Avalon Sciences Ltd

Slim Tractor Switch Sub – GSR-193

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

- The switching sub allows the six outer conductors to be combined downhole to minimise voltage drop when deploying a tractor at the bottom of a Geochain™ Slim string.
- Dedicated high current wiring then routes the tractor power along the central line 7 conductor through the ensure string.
- Wired to failsafe into either tractor mode or Geochain mode.
- The six outer conductors to be combined downhole to minimise voltage drop when deploying a tractor at the bottom of a GeochainSlim™ string.

Specifications

Length	18.5” (444mm)
Diameter	1 11/16” (42.9mm)
Weight	7.1lb (3.2kg)
Temperature	400°F (205°C)
Pressure	25,000 psi (1750 bar)
Voltage	400V Max
Current	7 amp Max

Functionality

- The GSR-193 is an in-line tractor switching sub for use with the GeochainSlim™ system. It is designed to sit directly below the wireline x-over unit and above the TAS in the Geochain Slim string.
- Dedicated high current wiring then routes the tractor power along the central line 7 conductor through the ensure string. The sub can be wired to failsafe into either tractor mode or Geochain mode.

Compatible with

SLIM
GeochainSlim

Avalon Sciences Ltd

Geochain Tractor Switching Sub – GCN-10

DOWNHOLE

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Main Features

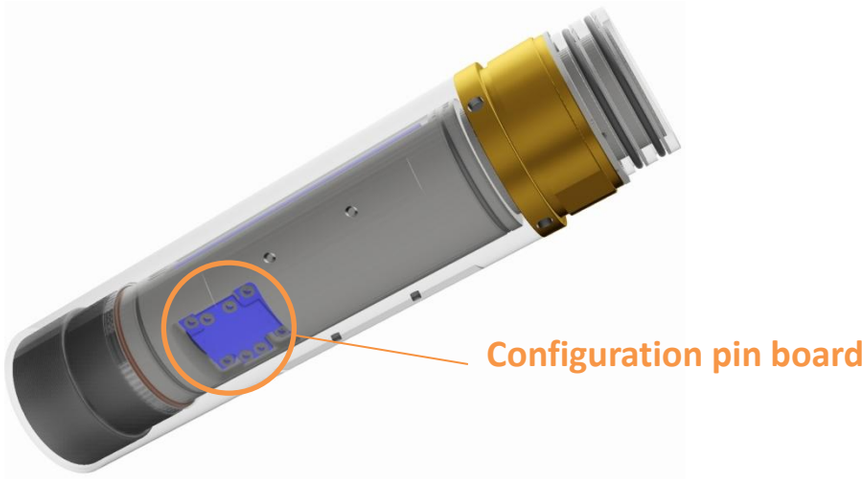
- The switching sub allows the six outer conductors to be combined downhole to minimise voltage drop when deploying a tractor at the bottom of a Geochain™ Slim string.
- Dedicated high current wiring then routes the tractor power along the central line 7 conductor through the ensure string.
- Wired to failsafe into either tractor mode or Geochain mode.
- The six outer conductors to be combined downhole to minimise voltage drop when deploying a tractor at the bottom of a Geochain™ Slim string.
- New configuration pin board: allows configuration for 4 wire or 6 wire wireline telemetry

Functionality

- The GCN-10 is an in-line tractor switching sub for use with the Geochain™ system. It is designed to sit directly below the wireline x-over unit and above the TAS in the Geochain string.
- Dedicated high current wiring then routes the tractor power along the central line 7 conductor through the ensure string. The sub can be wired to failsafe into either tractor mode or Geochain mode.

Specifications

Length	15” (381mm)
Diameter	3” (76.2mm)
Weight	5.5 lb (2.5kg)
Temperature	400°F (205°C)
Pressure	25,000 psi (1750 bar)
Voltage	400V Max
Current	7 amp Max



Compatible with

GEO
Geochain

Avalon Sciences Ltd

Male-Male Coupler– ASR 43

DOWNHOLE

Main Features

- High Pressure (25000psi) Male-Male coupler
- Compatible with Geochain system connectors.
- High temperature capability (401°F (205°C))
- Extremely quick and easy fitting.
- 21/22 ASR Connection

Functionality

- The Male-Male coupler allows easy coupling of two female Geochain connectors, using feed through connections.

Compatible with

GEO
Geochain

LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Specifications

Length	7.1” (80mm)
Diameter	3” (76.2mm)
Weight	5.1 lb (2.3kg)
Temperature	400°F (205°C)
Pressure	25,000 psi (1750 bar)

Connector Idents

Lower	Upper
B	B
D	D
F	F
J	J
L	L
N	N
X	X
P	P
U	U

21/22 ASR connection

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LEADERS IN BOREHOLE SEISMIC TECHNOLOGY

Cross Over Tools

DOWNHOLE

Functionality

- Avalon provide a range of cross over tools that allow the Geochain systems to be utilised with third party equipment. Such third party equipment includes logging tool, downhole receiver tool and sparker tools.

Main Features

- Quick and easy fitting.
- Compatible with all ASR equipment.
- Temperature rating of 401°F (205°C)
- .
- Pressure rating of 25,000psi.

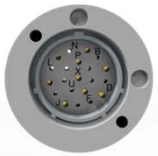
Specifications	*HAL-7*	*HAL-1*	*HAL DITS*	*HAL RWCH*	*LEHQ*	*BAS-1/BAS-2*	*HAL-HETS*
Cross over type	Go7 to 21/22 connector	Go1 to line 7 on Female 21/22 connector	DITS to 21/22 connector	DITS 19 way to 21/22 connector	LEHQ to 21/22 connector	10 pin to 21/22 connector (BAS-2 = 10 pin socket)	HETS (H4TG) to 21/22 ASR connector
Length	5.5” (140mm)	6” (152mm)	12.5” (318mm)	12.5” (318mm)	13” (330mm)	9” (229mm)	10.91” (277mm)
Outer Diameter	3.1” (78mm)	3.1” (78mm)	3.6” (92mm)	3.6” (92mm)	3.4” (86mm)	3.5” (88mm)	3.0” (76mm)
Weight	3kg (6.6lbs)	3kg (6.6lbs)	8.3kg (18.3lbs)		8.5kg (18.7lbs)	6kg (13.2lbs)	4.5kg (10lbs)
Temperature	401°F (205°C)	401°F (205°C)	401°F (205°C)	401°F (205°C)	401°F (205°C)	401°F (205°C)	401°F (205°C)
Pressure	25,000 psi (1750 bar)	25,000 psi (1750 bar)	25,000 psi (1750 bar)	25,000 psi (1750 bar)	25,000 psi (1750 bar)	25,000 psi (1750 bar)	25,000 psi (1750 bar)

Compatible with

GEO

Downhole End

21/22 ASR connection



Uphole End

Go7 connection

RWCH connection

DITS connection

LEHQ connection

HETS connection