

GSR-1 Geochain Slim Receiver

Functionality

The standard arm will accommodate boreholes from 1-7/8" to 7" and an extended arm can be used to increase this range to 13". The locking force is constant to within 20% throughout its operating range and will lock into 3-1/2" drill pipe in fifteen seconds.

The tool comes as standard with a three component fixed sensor pack using dual high sensitivity OMNI-2400 geophones. The sensor pack will work in any orientation from vertical through to horizontal.

The GSR is a development of the well tried and tested ESR tool and has been designed so as to require very little servicing. Routine maintenance can be performed in a few minutes and even a complete overhaul can be accomplished in less than an hour.

The arm mechanism has a fail safe feature to facilitate recovery of the tool in the event of downhole failure. In dual or digital mode all locking arms open in parallel to further reduce survey times.

The tool can be used in single or dual tool analogue mode and can be combined with our GRT-3 Gamma Ray tool for depth correlation. In digital mode the tool can be combined to a maximum of 24 levels with 200m spacing between levels. All using standard seven conductor wireline throughout.



ITC-3 inter-tool cable



DCP-2 control panel

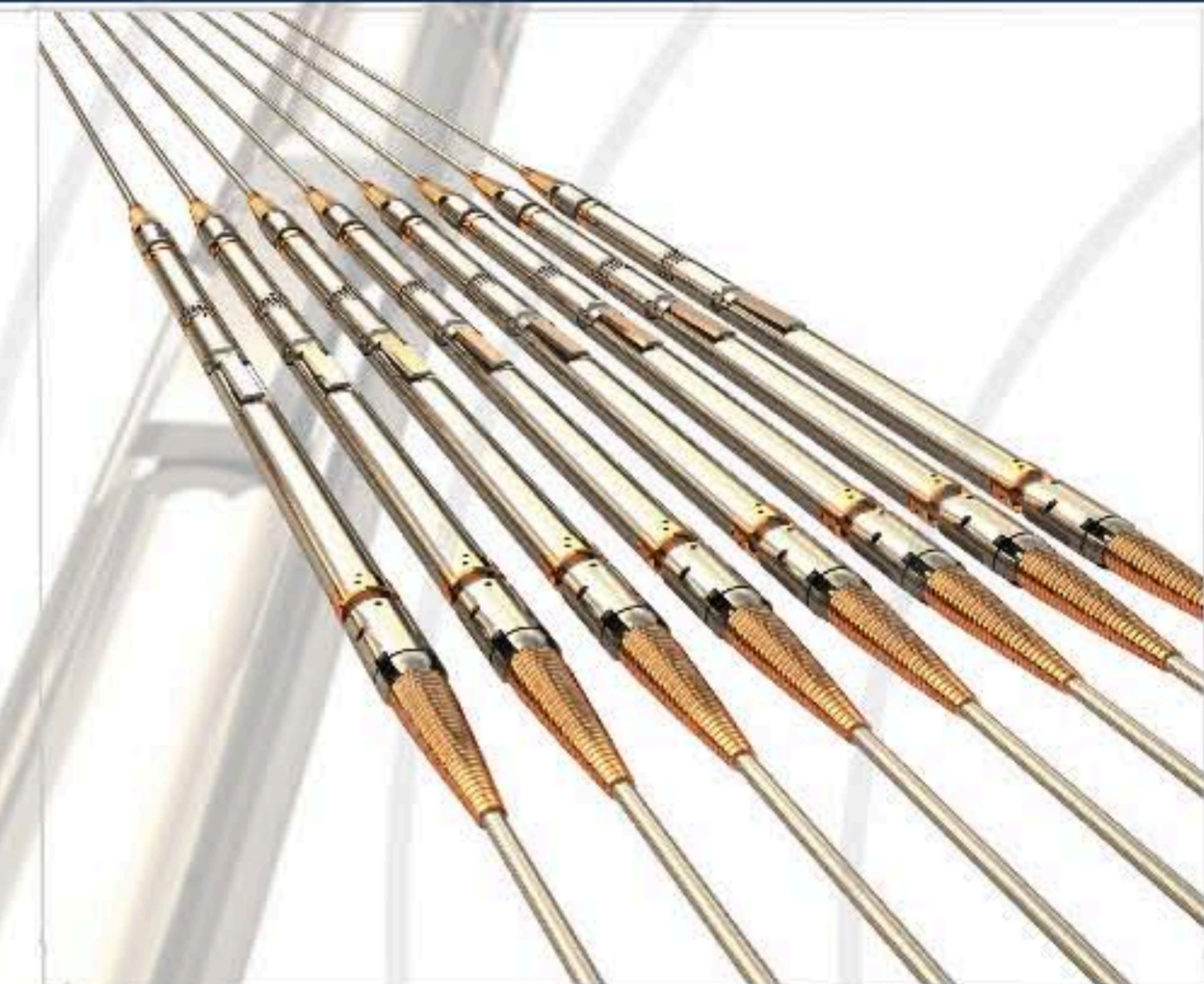
GSR-1 Specifications

Length:	44" (1135 mm)
Diameter:	1-11/16" (43 mm)
Weight:	10 lbs (4.5 kg)
Locking range std:	7" standard.
Locking range ext:	13" with arm extender.
Temperature analogue:	400°F (204°C).
Temperature digital:	356°F (180°C).
Pressure:	20,000 psi (1400 bar)
Sensors:	OMNI-2400
Well deviation:	0°-95°
Control panel analogue:	DCP-2 panel
Control panel digital:	Standard Geochain™ panels

Main Features

- 1-11/16" diameter
- Up to 64 satellites
- Standard 7 conductor wireline (monocable under development)
- Dual OMNI-2400 geophones
- ACS® active cooling system for continuous operation up to 180°C
- 20,000psi pressure rating
- 24-bit delta sigma
- Up to 200m (>600') between satellites
- Optimised for both VSP and hydraulic fracture monitoring work
- High side indicator to determine tool rotation in deviated wells

GeochainSlim™ 64 level borehole seismic array



- Now up to 64 different levels!
- Ideal for microseismic monitoring
- Half the external diameter of the Geochain™!

General Information

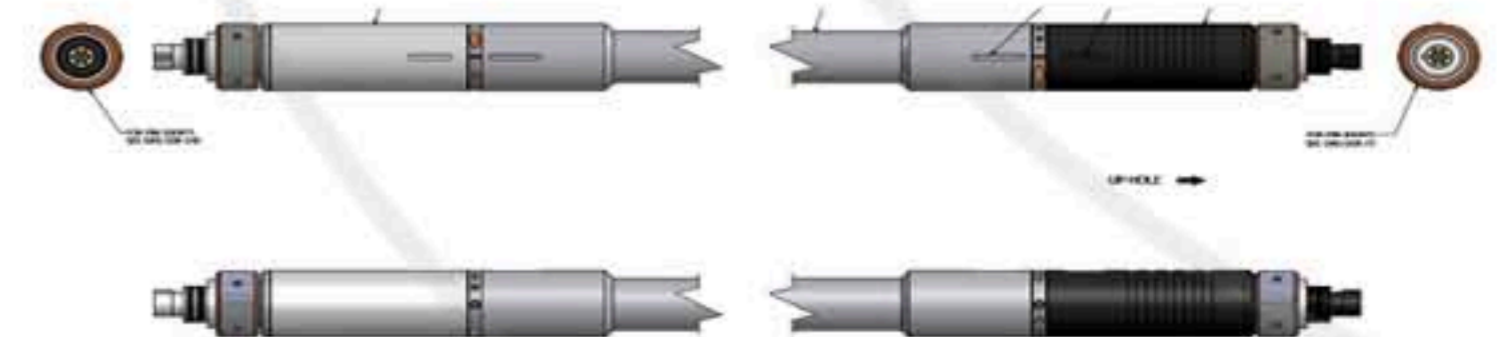
The GeochainSlim™ is the next development of the field proven and hydraulic fracture Geochain™ system. It is based around the new GSR geophone which itself is a development of the tried and tested ESR slim hole geophone. The system has been optimised for use in both VSP and hydraulic fracture monitoring with dual OMNI directional geophones

Functionality

The GeochainSlim™ array has been designed for use in open or cased holes with all locking arms opening simultaneously to reduce survey time. A maximum bandwidth of 1600Hz, very low electronic noise levels and slim size make the system ideal for hydraulic fracture surveys.

New Rigid Inter Tool Cable option (RITC)

The GSR receivers accommodate a modular construction 25' rigid inter tool connector rated to 20,000psi, 200°C. This low maintenance item provides precise tool alignment and can be coupled together to give a 50' spacing.



GeochainSlim™ 64 level borehole seismic array

GSR-1 Geochain Slim Receiver (Digital or Analogue modes)

Specification

Telemetry	Sample rate	Bandwith Hz	Sondes
	250us	1600	8
	375us	1066	12
	500us	800	16
	625us	640	20
	750us	533	24
	1000us	400	32

Dynamic Range	>112dB
A/D convertor	24 bit Delta-Sigma
Distortion	<0.02%
DC offset	Self-calibrating
Timing accuracy	Better than 5 ppm
Cable equalisation chip	Fully automatic using internal DSP
Temperature	356°F (180°C)
Pressure	20,000psi (1400 bar)
Sensors	Dual OMNI2400 15Hz



An optional tension compression sensor and motion detector provide real time surface read out to prevent tool hang up. A threshold alarm can be set to warn the wireline operator if tension or motion levels change.

The downhole distributed electronics features 24 bit Delta-Sigma converters along with switchable downhole gain for maximum dynamic range. Continuous PLL synchronisation to the surface clock allows for very long record lengths* with no timing skew.

Full in field processing is provided by our highly praised VSProwess® software (please see our separate datasheet for full details) allowing complex data processing to be performed at the rig site.

An optional gamma ray tool or CCL can be used for depth correlation and line 7 (on hepta cable) is free for use with any third party tools that meet the single conductor power requirements.

*Currently 128 seconds but to be extended to continuous recording in the near future.

Main features

- 1-11/16" diameter
- 3 component geophones
- 200°C max. temperature rating
- 20,000psi pressure rating
- GO7 heads at both ends
- High locking force to weight ratio
- Dual tool plus gamma on 7 conductor wireline
- Simple conversion to digital mode for use in the GeochainSlim™ system.
- 7" arm opening as standard

General

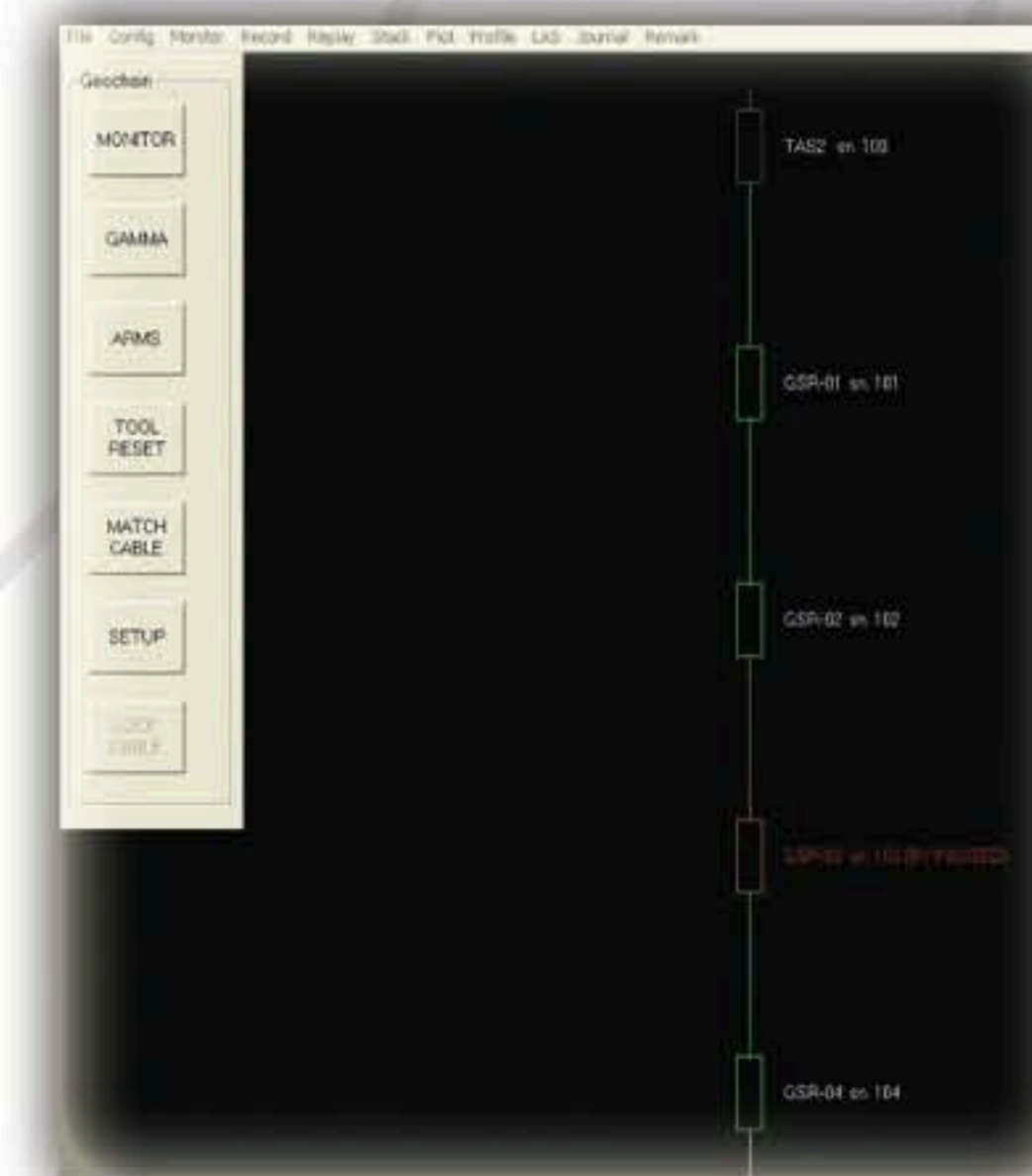
The GSR geophone is a compact three component electro-mechanical downhole geophone. It is designed for use in wells up to 20,000psi and 200°C and provides a fast arm cycle time with an arm force to weight ratio of 5:1. It can be easily and quickly converted from an analogue system (up to two tools) to part of a multilevel digital GeochainSlim™

Sensors

The GSR comes with a three component sensor pack as standard. The sensors are fixed dual OMNI-2400 15Hz geophones which are suited to both VSP and fracture monitoring surveys

New Bypass Mode

The latest user friendly interface for the seismic engineer. The new 'Bypass' mode in the software enables data recovery from all active receivers, preventing any individual satellite failures from compromising the survey.



ACQ monitor mode displaying tool bypass. Any dead tools can be bypassed, allowing communication and instruction to all tools below.