

# Borehole Seismic



## Energy sources Jack

Jacks is the lightest, most compact, and fastest energy source in the world that ensure the operation of borehole sparker and electrodynamic sources used in geophysical surveys.

- High-charge rate
- High-energy level
- Up to 3 times lighter and more compact than analogues
- Power consumption control
- Remote control unit available
- Easy control and programming of cycles



Jack model	500	1200	2500HP	5000HP	10000HP
Maximum pulse voltage, kV	2-4 (standard) or 4-6 (option)				
Type of charger	pulse charger				
Trigger mode	external / periodic / programmable / manual				
Operating energy range, J	50 ÷ 500	300 ÷ 1200	300 ÷ 2500	300 ÷ 5000	300 ÷ 10000
Maximum charging rate, J/s	500		1500	3000	3000
Power mains	110 or 220 V, 50/60 Hz				
Maximum power consumption, kW	1		1/2/3	1/2/3/4/5/6	
Overall dimensions, cm	49 × 37 × 23	54 × 41 × 27	63 × 50 × 30	58 × 59 × 69	58 × 59 × 100
Weight, kg	18	22	34	99	130

## Borehole sparker Pulse

Borehole sparker Pulse is developed for generating high frequency pressure (P) waves in water-filled wells of up to 1000 m deep during vertical seismic profiling (VSP) and crosshole seismic testing or tomography (CST).

- High-repeatable broadband signal
- Supplied with specially designed cables, reels, or winches with HV slip ring
- Easily replaceable electrode groups
- Different groups for adjusting wavelet shape and its amplitude spectrum



Operating voltage	up to 6000 V
Operating energy	up to 1500 J (optional: up to 10000 J)
Well diameters	from 70 mm (optional: from 40 mm)
Maximum well depth	1000 m
Reel dimensions	760×775×400 mm
Weight with a reel	60 - 70 kg (depends on the cable length)
Sparker diameter	60 mm (optional: 36 or 80 mm)
Sparker length	500 mm
Cable type	coaxial with polyurethane insulation
Conductor cross-section	10 mm <sup>2</sup> (optional: 20 or 50 mm <sup>2</sup> )
Breaking strength of the cable	3 kN (optional: 5 and 30 kN)



# Borehole source of SH and P waves SHock

SHock is a unique borehole source, which is designed for generating horizontally polarised shear waves (SH) and compressional waves (P) for reversed vertical seismic profiling (VSP) and crosshole seismic testing or tomography (CST).

- High-repeatable broadband signal
- P- and SH- wave generation
- Operations in dry and water-filled wells
- HV slip ring on the winch



Operating voltage	up to 6000 V
Operating energy	up to 1500 J
Well diameters	70-140 mm
Diameter	65 mm
Length	970 mm
Dimensions on a reel	570×550×650 mm
Weight with a reel and a 130 m pneumo-electric line	93 kg

# Borehole source of SV-waves GeoSV

Borehole electrodynamic source GeoSV is used for generating vertically polarized shear waves (SV) in dry and water-filled wells up to 200 m deep during parallel crosshole seismic testing (CST) with distance between boreholes 3 – 6 m.

- Designed for parallel CST following ASTM D4428 / D4428M standards
- No need to orientate
- Upward & downward vertical shear waves
- Pneumatic locking system



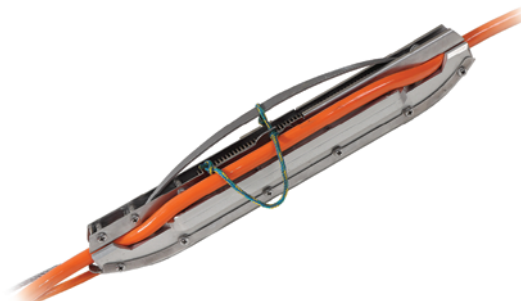
Operating voltage	up to 3000 V
Operating energy range	100-300 J
Diameter	65 mm
Length	6500 mm
Waterproofing	200 m
Max air pressure	25 bar
Air pipe connection	6 mm
Max piston range	21 mm
Frequency bandwidth	100-600 Hz

# 3C multi-level borehole seismic array GStreamer

Series of 3C seismic arrays GStreamer are designed for vertical seismic profiling, downhole seismic logging, and cross-hole seismic testing and tomography.

## GStreamer – 3C downhole seismic array with spring anchoring system

- For PVC-cased wells up to 150 m
- Remote triggering of anchoring system
- No extra load required to lower into the well
- No limit on data sample rate
- Compatible with almost all seismographs
- Most compact and lightweight in the World
- Simple and reliable design



## GStreamer-P – 3C borehole seismic array with pneumatic anchoring system

- For open hole or cased wells up to 1000 m
- Simultaneous anchoring of all levels
- The anchoring is not weakened when the soil subsides under the anchor
- No limit on data sample rate
- Compatible with almost all seismographs
- Multiple 3-component sensor options



## GStreamer-E – 3C borehole seismic array with motor-driven anchoring system

- For open hole or cased boreholes up to 1000 m
- Individual control of tool anchoring
- Reliable fixation in the well
- No limit on data sample rate
- Compatible with almost all seismographs
- Multiple 3-component sensor options

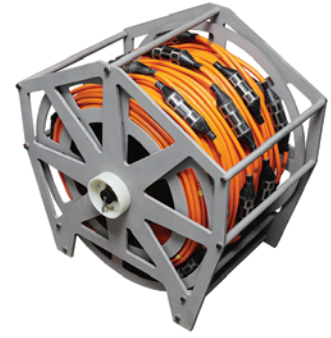


Model	GStreamer	GStreamer-P	GStreamer-E
Number of levels	4 or 8	4 or 8	1, 4, or 8
Anchoring	spring system	pneumatic cylinder	geared motor
Well casing type	PVC	any or open hole	any or open hole
Number of components	3	3	3
Geophones natural frequency	12 Hz or 20 Hz (on request)	12 Hz or 4.5 / 20 Hz (on request)	
Tool locking	remote triggering	simultaneous	individual
Clamping force	1:7 – 1:11	1:11 at 7 atm	1:11
Maximum tool diameter	60 mm		58 mm
Well diameter range	70 – 150 mm	65 – 150 mm and more with anchor extenders	
Maximum operating pressure	15 bar		>100 bar



# Borehole hydrophone array WellStreamer

WellStreamer is a borehole hydrophone array, specially developed for seismic acquisitions in water-filled wells. WellStreamer can be supplied in various configurations, starting from 4 channels and up to 48 units with a typical separation of 1 m or 2 m.



- Specifically designed for HR borehole surveys
- Fast and simple in field operations
- High sensitive acceleration-insensitive hydrophones
- Compatible with any seismograph

Cable system	
Type	linear with preamplifiers
Number of channels	4, 6, 12, 24, or 48
Interval between channels	on request, but $\geq 0.25$ m
End connector type	as agreed
Hydrophone module diameter	42 mm
Piezoelectric element	
Operating frequency range	10 ÷ 10 000 Hz
Sensitivity	180 $\mu$ V/Pa
Capacity	4000 pF
Maximum working pressure	60 atm
Sensitivity to accelerations	acceleration-insensitive

Preamplifier	
Type	low-noise dissymmetric
Gain	6 dB
Current consumption per channel	10 mA
Output resistance	395 Ohm
Power supply voltage	$\pm 12$ V, bipolar
Maximum output level	$\pm 3.8$ V
RMS voltage of the intrinsic electrical noise, given by output, in the operating frequency range	less than 10 $\mu$ V
Usage conditions	
Operating temperature range	-10 ÷ +70 °C
Storage temperature range	-40 ÷ +70 °C

## Borehole winches

Borehole winches (BW) are specifically designed for geophysical well logging using various methods.

- Best option for hydrophone arrays, 3C probes and sparkers
- Electric drive with remote control unit
- Built-in slip ring
- Integrated counterweight with optional winch roller

	BW-250	BW-70
Materials	stainless steel and polymer	duralumin and polymer
Drum pitch diameter, mm	500	460
Drum outer diameter, mm	1000	710
Drum width, mm	400	300
Drive	electric gear motor (main) and manual (standby)	
Motor power, W	1500	
Power mains	220 V AC 50-60 Hz	12 V DC
Weight without cable, kg	200	50
Dimensions (without counterweight), mm	1000×1000×800	760×420×775



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