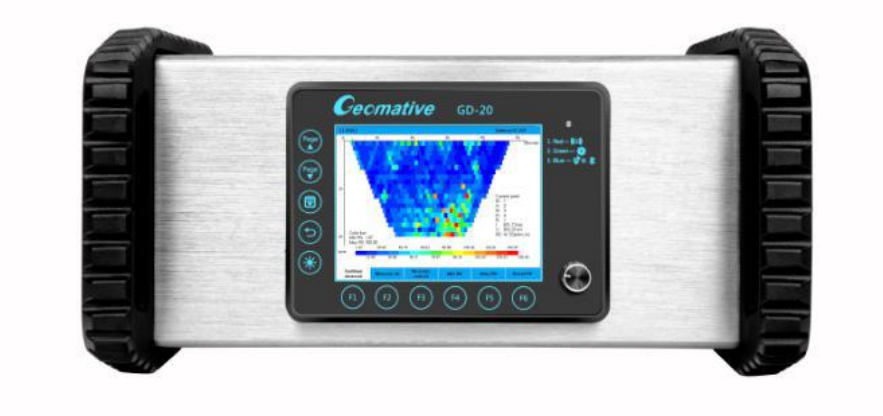
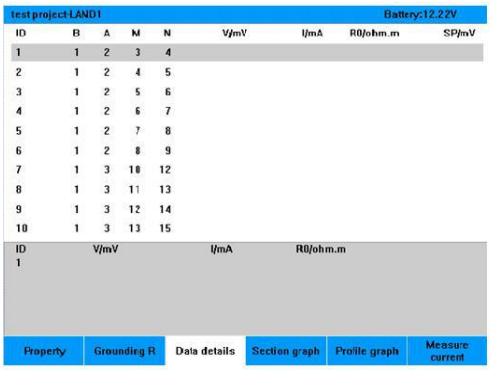
GD-20 Resistivity and IP Imaging System

RES/IP/SP
5 / 12 independent channels



GD-20 is a brand new multi-channel geo-electrical system, designed with 5 and 12 channels. In the process of ERT test, GD-20 can synchronously acquire 10 measuring points which greatly enhances testing speed in the field. It's applicable to Resistivity, Self-potential (SP) and Induced Polarization (IP) test. Compared with single-channel GD-10, the average testing speed of GD-20 ERT system is increased by two to three times and extremely shortens working time.



GD-20 is portable and equipped with internal storage for data recording. The multi-channel switch boxes supports VES, ERT and N-∞. VES can simultaneously test 12 sounding points. The ERT test

satisfies 10-channel data acquisition. N-∞ supports the application of N connecting with the Infinite device. The independent 10-channel design furthest enhances the testing efficiency.

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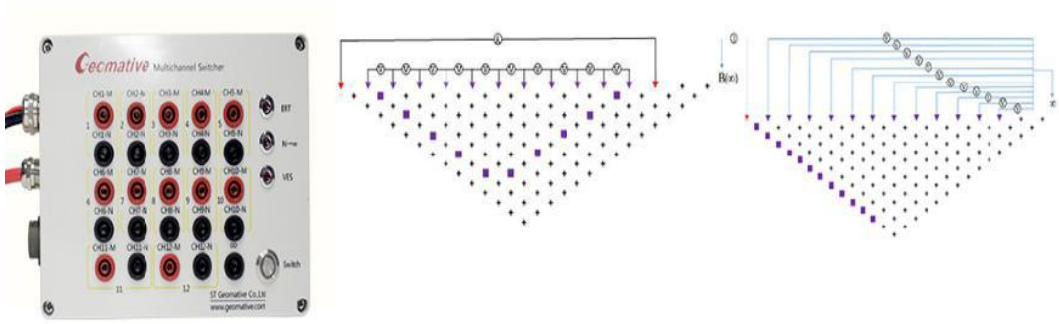
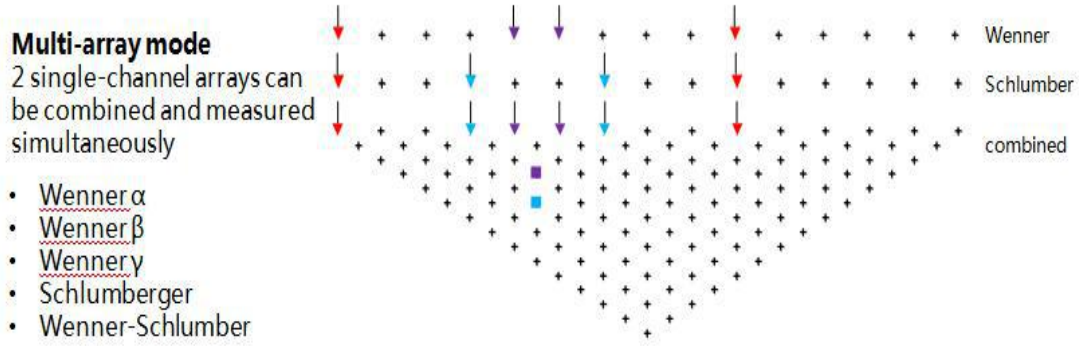


Multi-array measurement: Aimed at single-channel scripts, GD-20 supports simultaneous measurements of two different array scripts, not only enhancing efficiency, but also guaranteeing the stability of testing environment.



Multi-channel design and optimization greatly improve testing efficiency.

- ❖ The average testing speed is enhanced by 2-3 times, indicating a 30-day project can be completed within 10 days.
- ❖ The average speed of 2D IP test is enhanced by 4-5 times, indicating a 30-day project can be completed within 7 days.
- ❖ Under the same condition, GD-20 system is more efficient than AGI Supersting R8 system.

ERT Resistivity Test Time Comparison

Device script	Number Of Electrodes	Geomative	GD-20 12-Channel System	GD-10 Singel- channel System	AGI	AGI Supersting R8 8-channel system
		Number of Measuring Points	Testing Time (m)	Testing Time (m)	Number of Measuring Points	Testing time (m)
Dipole-dipole	120	5265	75	123	4850	161
AM	120	7140	70	166	7095	115
Cross-hole	60	2255	23	56	2255	72
Wenner	120	2340	58	58	2340	288

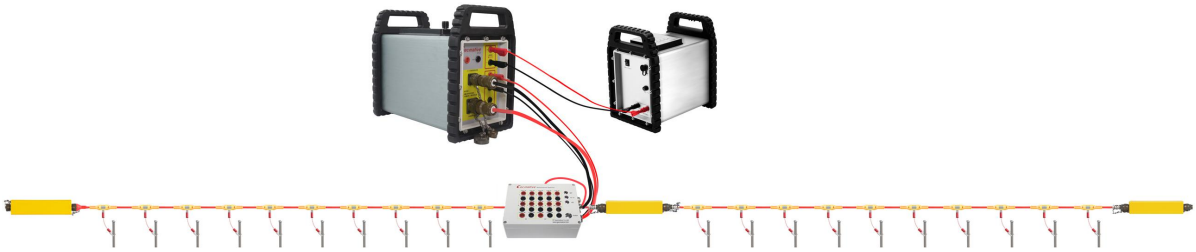
ERT test time contrast (16s cycle)						
Device script	Number of Electrodes	Geomative	GD-20 12-channel System	GD-10 single-channel System	AGI	AGI Supersting R8 8-channel system
		Number of Measuring Points	Testing Time (m)	Testing Time (m)	Number of Measuring Points	Testing Time (m)
Dipole-dipole	120	5265	525	1942	4850	851
AM	120	7140	466	2023	7095	609
Wenner	120	2340	663	663	2340	1521

Main Applications:

- ★ Mining prospecting
- ★ Groundwater exploration
- ★ Geotechnical engineering investigation
- ★ Detection of Karst cave and fractures
- ★ Geological mapping
- ★ Archeological studies
- ★ Bore-hole logging / cross-hole survey
- ★ Dam leakage investigation
- ★ Seawater Intrusion Survey
- ★ Real-time monitoring of natural hazards,soil remediation and tailing dams
- ★ Sediment Detection of rivers and lakes

In ERT test, the multi-electrode cable wiring way has the biggest influence on the construction efficiency. The cable volume, weight, wiring efficiency, component reliability, and flexibility to adapt to a variety of environments and needs are very important.

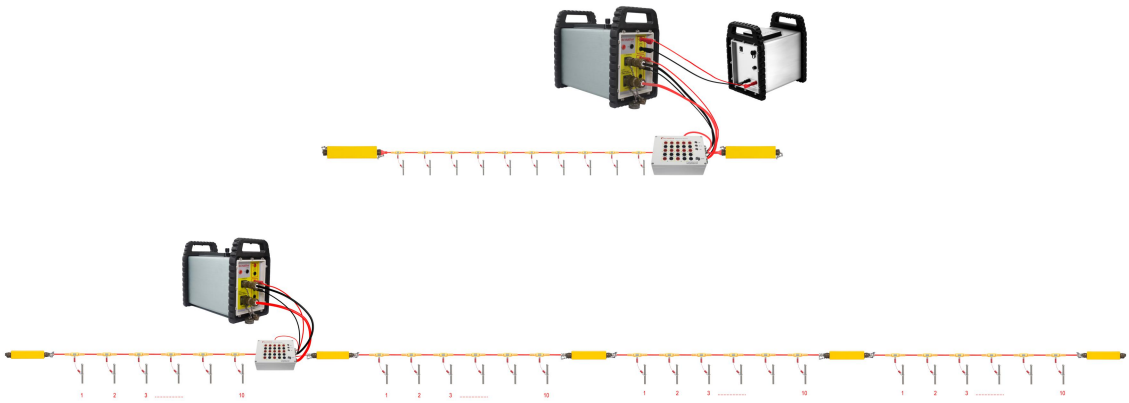
Geomative integrates the advantages of traditional centralized wring mode that are higher reliablility and lower cost and advantages of regular distributed wiring mode that are cable layout of higher efficiency and profiling measurements of infinite extension. Based on all the advantages above, Geomative has developed a unique segment-concentrated distributed technology.
A cable has 5 dual takeouts or 10 single takeouts, through a centralized swapping control performed by two switch relays. A distributed control is conducted between the host and switch relay which is not only applicable for long-section ERT test, but also applicable for IP test.



GD-20 adopts modularization and upgradeable design concept, decreasing the cost of hardware maintenance and replacement. When clients intend to upgrade the purchased instrument, they only need to buy the licensing function and standard accessories. The following upgrade can be performed online on Geomative Studio software, making pre-purchased hardware resources are fully utilized. Furthermore, by means of Geomative Studio, GD-10 system realizes two features as follows:

- The engineering management mode enables clients to manage complicated tasks and measurement data of fieldwork.

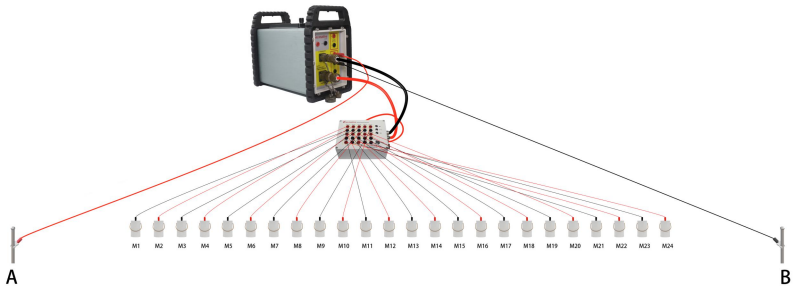
- The array script management helps clients to shorten working time in the field and enhances working efficiency.



Function Introduction:

1D Resistivity/SP/ IP VES

In 1D VES survey, transmission up to full power 7200W (1200V*6A) can be emitted to allow excited pulse signals to reach deeper strata. For small signals, up to 255 stacking amounts are allowed to enhance measurement accuracy. 1D survey layout can be placed and measured at 12 points concurrently, further reducing the amount of electrode scanning.



1D array scripts

4P-VES	Composite Profiling
Dipole VES	3P-VES
Mid-grandient	User defined

2D ERT or IP Scanning

GD-20 ERT and IP system is capable of conducting 2D cross-section profiling of ERT and IP in field. Through the array script management in Geomative Studio, clients can predefine survey parameters on PC prior to field surveys. Up to 3200W (800V*4A) transmission power can be deployed in field.

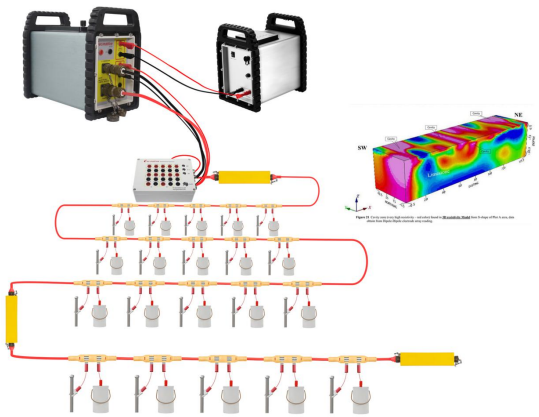
The 2D array

α-Arranging / Winner
β arrangement / dipole devices
γ Arrangements / Differential Devices
Triode AMN
Pole AM
Dipole - dipole
Schlumberger devices
Triode AMN
Winner - Schlumberger Arrangement
Tri-polar MNB
Cross-Hole Devices
Bipolar Triode
Edge gradient
Borehole equipment

3D ERT or IP Scanning

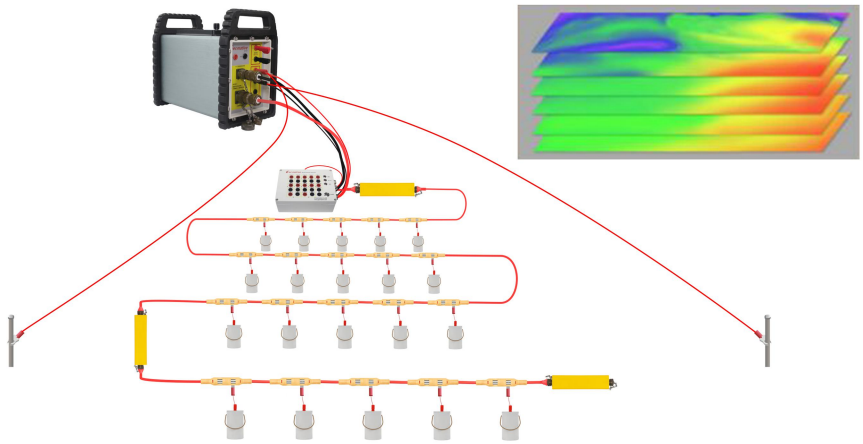
Using GD-20 ERT and IP measurement system, the sectional centralized cabling layout can be deployed robustly in a snakelike layout pattern to perform 3D ERT and IP survey. Up to 3200W (800V*4A) can be transmitted under this mode. If ERT cabling is insufficient, limited cabling can be deployed in a dual-direction shifting combination or multiple paralleled 2D survey line data fusion method to cover a larger 3D region.

High-power IP Mid-gradient scanning



Geomative is the first one in the industry to adopt ERT modules in the high-powered IP mid-gradient cross-sectional profiling. Similar to the ERT method, clients can deploy a pair of AB electrodes and multiple sets of non-polarizable electrodes. AB transmitting electrode is connected to the AB terminal port on the GD-20, while the non-polarizable electrodes are connected to the ERT cables takeouts.

During IP survey, the host instrument emits electrical signal simultaneously and sequentially select MN electrodes in automated mode. Under sufficient amount of cabling and electrodes, the whole lateral cross-sectional profiling can be accomplished in one run, with a significant enhancement in survey efficiency. If signal emission is performed using external transmitter, clients can simply connect the AB terminal port of GD-20 host to the emission circuit in series. GD-20 will automatically monitor and detect the transmitted electrical signals, triggering and synchronizing the MN acquisition channels simultaneously.



The 3D Array script

Wenner（α）

Wenner（β）

Schlunmberger

Dipole-Dipole

Pole-Dipole

Pole-Pole

Mid gradient

Features:

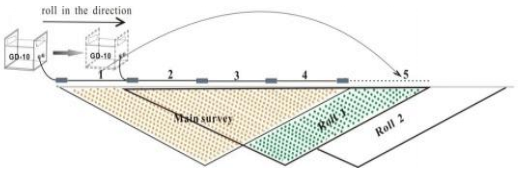
- **Efficiency and Data Quality Guaranteed by Automatic Stacking**

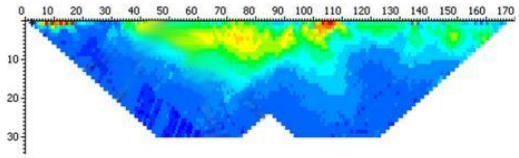
  GD-20 automatically computes and analyzes signal strength and data quality during data surveys, in order to determine whether or not the acquisition durations and intervals should be extended to enter data stacking mode. GD system enters highly efficient scanning survey for detecting locations with high signal-to-noise ratio, otherwise the acquisition duration is extended or data stacking mode is activated to enhance data quality as much as possible. Clients can also select desired stacking amount according to any point, layers or survey tasks.

- **Efficiently Optimized 2D Roll-along Survey**

  In case of limited cable amount and length, roll-along survey can be used to cover sufficiently long profiles.

  Based on the comprehensive scripting function of Geomative, for each newly created roll-along profiles, the system will only load the array configuration script for the current roll-along profile instead of survey points from the entire profile, boosting survey efficiency significantly.





★ Novel Dual-Way Connection and Management Technique

Geomative innovated a novel dual-way connection and switching technique, which utilized the front cable connector to manage any arbitrary takeouts. The second last cable takeouts (for dual-takeout cable) or the last cable takeout (for single-takeout cable) at the end of cable core is used to connect the preceding cabling via the cable connector to the subsequent cabling section, in order to establish dual-way connection and management.

1) Single-takeout cabling : By using multiple core cable with the same core amount, connectable takeout amount is doubled up.

2) Double-takeout cabling : The second connecting point can be combined into the current electrode, in order to double up the maximum transmissible current. Non-polarizable electrodes can also be installed in the survey layout, in order to transform into an IP measurement system with individual transmitting and receiving electrodes.

- The protection level of multi-electrode cables and switch relays has reached IP67, fully capable of profiling measurement, with unique 12-channel ERT simultaneous reception scheme, more effective completion of surface data acquisition.

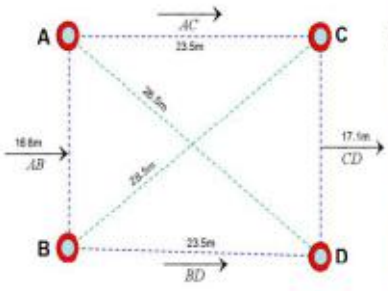
- Both built-in GPS and external differential GPS signal input is supported. Under continuous roll-along survey, location information can be recorded in real-time.

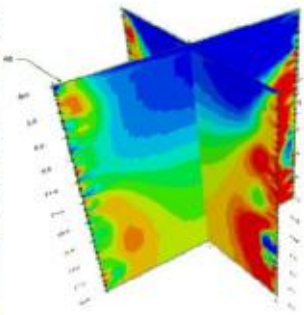
★ Multi-dimensional Customized Solution for Borehole Monitoring

Our borehole survey solutions overturneds the conventional practice of 1D resistivity sounding the in borehole surveys, which supports SP, ERT, IP and other data collection approaches

- Hole-hole
- Hole-ground
- Hole-ground-hole

GD-20 is equipped with customized electrode wiring box and marine cables, made of stainless steel and titanium alloy, greatly enhancing oxidation stability and data acquisition accuracy.





- **Powerful GD-20 Monitoring Host**

  - GD-20 Supreme ERT System can perform instantaneous measurement up to 10 channels, where every measurement only requires 1 second, so towed continuous roll-along profiling can be performed.
  - The maximum 4A transmitting current can not only adapt to high conductive marine environment, but also measure effective signals from deeper depths through high current emission.
  - Both built-in GPS and external differential GPS signal input is supported. Under continuous roll-along survey, location information can be recorded in real-time.

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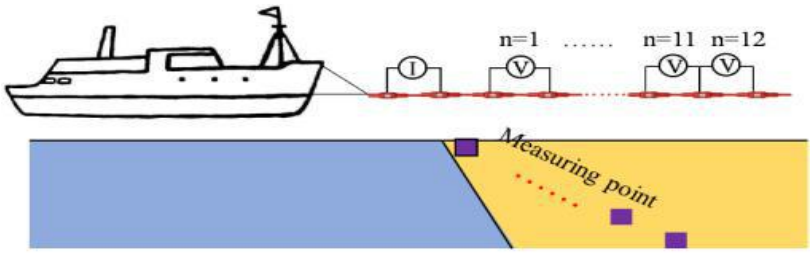

Technical Specification

Transmitter

Maximum Tx power : 7200W

Maximum Tx Voltage : 1200V

Maximum Tx Current : 6A

Current accuracy : Better than 0.3%

Host Protection : IP65, over-current, over-voltage, short circuit

Pulse type : square wave

Pulse width : 1s、2s、4s、8s、16s、32s

Input impedance : ≥200MΩ

Receiver

Channels : 5,12

Manual iteration : 1~255 times

Automatic iteration: 1~10 times

Voltage range : ±24V

SP compensation : ±10V

Noise rejection : ≥120dB

Dynamic Averaging : 24bits A/D conversion

Accuracy : 0.3%±1uV

Precision: 0.1%

Others

Weight : 8.5KG

Size : 39cm*20cm*29cm

Storage temperature : -10℃~+60℃

Working temperature : -10℃~50℃

Operating humidity : ≤95%

Memory capacity : 8GB

Charging voltage : 120~250VAC（50HZ/60HZ）

Display screen : 5.7-inch full-color LCD screen, 640*480

Waterproof rating: IP67

External power : DC24~60V

Built-in battery : 16.8V lithium battery

I/O Port ： USB,RS485