

### Acoustic Emission Transducers (GDSAE)

The Acoustic Emission transducers enable micro- fractures occurring within a rock specimen during testing, to be recorded and analysed. Analysis of rock micro fractures can give information as to the failure mechanisms of a sample under tests well as determining the onset of failure.

The GDSAE system can be configured either as a simple Hit Counter type system or a full fracture location / velocity tomography system. The GDSAE system may be specified as a triggered type system or a continuous acquisition system. The triggered system yields less but more simple data to process whereas the continuous system never misses a beat. The system can be configured to use both types of data acquisition.

#### Key Features:

High speed data acquisition systems:

- Continuous System: 10MHz:
- Triggered System: 50MHz

High resolution with 12-or 16 Bit:

Synchronous data acquisition:

Varied systems range:

Submersible Transducers:

Compact design:

Lightweight:

Easyfit design:

Coaxial High pressure feed throughs:

#### Benefits to the User:

High Speed data acquisition yields high resolution measurement in the time domain.

High Bit counts allow for high resolution measurement in terms of amplitude.

Truly synchronous data acquisition means that the recorded data does not need to be corrected for time shift across each channel during the acquisition process. This makes for simpler processing of data.

Systems range from simple counter systems through to complete systems that can locate the origin of the event within the sample.

Acoustic Emission sensors have been tested at pressures up to 64MPa and are designed to withstand 100MPa. The sensors are for use in non-conducting media only.

Allows the sensors to be fitted to most systems.

Titanium construction means the sensors are sufficiently light enough, that they can be supported by the membrane alone with no need for a support structure.

Using GDS push in, self-sealing grommets, sensors can be fitted to standard membranes by simply cutting a small hole in the membrane.

50 Ohm high pressure (64MPa) feed throughs in either single or triple channel configurations.

#### Upgrade Options:

- Triggered data acquisition system.
- Continuous data acquisition system.
- Continuous and triggered data acquisition system.
- Optional velocity tomographic surveys to “map” the acoustic velocity variations within a sample.

#### Technical Specification:

<b>Pressure Range (MPa):</b>	100 in non-conducting fluid
<b>Specimen Diameters (mm):</b>	Fits all sample sizes
<b>Weight:</b>	0.01 kg

## Triggered & Continuous Systems

There are two different data acquisition types available for the GDS acoustic emission system, continuous and triggered. The triggered system is armed and waits for an acoustic emission before starting to acquire data, it then acquires data for a pre-determined time before stopping and waiting for the next trigger signal or event. The continuous system commences data acquisition when started and then runs until stopped.

The advantage of the triggered system is that the volume of acquired data is massively reduced, this may however result in some missed events. The continuous system misses nothing.

After a test, the data needs to be leached, this is the process of sifting through the data to look for events. This is done automatically by pre-setting the properties of the events that are to be analysed. These properties include, but are not limited to, amplitude, frequency and the number of sensors that “see” the event.

This is where the main advantage of the continuous system becomes apparent, in that if the trigger properties do not yield sufficient data or are set erroneously, the leaching process can be repeated with different parameters, because all the data available is acquired. Were the trigger settings not correct for the triggered system the whole test would have to be physically repeated.

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### Triggered System:

As the data acquisition systems are only triggered when an event occurs and for a limited duration, the data acquisition speeds can be faster than for continuous systems. Due to this the triggered system becomes the right choice when studies are being made on either very stiff samples (and so very high propagation speeds) or smaller samples where the acquisition rate needs to be faster to maintain resolution on the arrival times at the sensors.

Triggering can be set to all sensors and to occur across multiple sensors within a given time window, to ensure that less spurious signals are triggers for the data acquisition systems.



Fig 1. Triggered system shown.

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### Continuous System:

The continuous system uses the catch-all approach, in that the acquisition is running from the moment the start button is pressed until it is stopped. The harvesting of continuous data allows the user to reprocess data in many different ways to ensure that nothing is missed. Data can be digitally filtered, threshold triggered along with many other processing options with the supplied software.

Please note: The volumes of data produced by the continuous system are very large so the system is supplied with a minimum of 6Tb for a 12 channel system with another 2Tb in the building server grade processing PC.



Fig 2. Continuous system shown.

## Transducers:

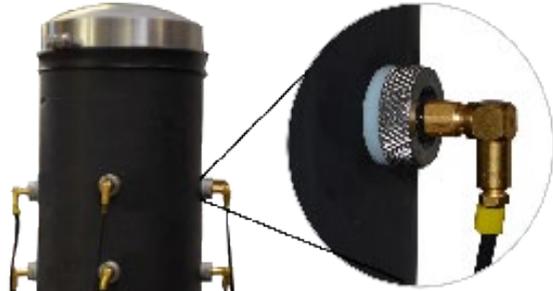


Fig 3. Transducer fixed on to a specimen, using GDS' self-sealing grommets.



Fig 4. Unmounted Transducer

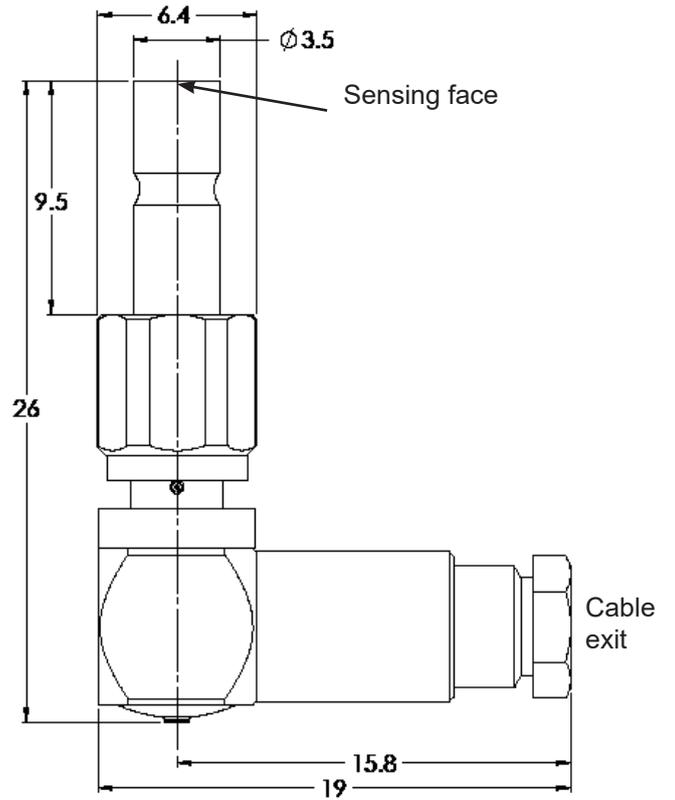


Fig 5. Detailed technical drawing of transducer

## Software:

- Data Acquisition & Control.
- Data leeching (to extract Acoustic Emission instances from continuous data).
- Picking & Auto Picking.
- Acoustic Emission event locating.
- 3D modelling of event locations.
- Set-up and execute for velocity surveys.

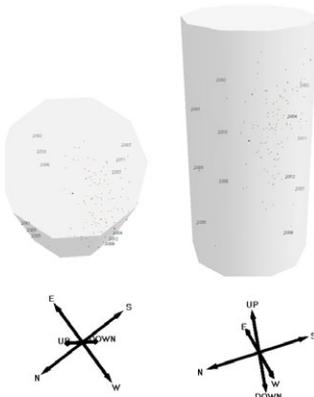


Fig 6. Shows 3D Modelling of event locations

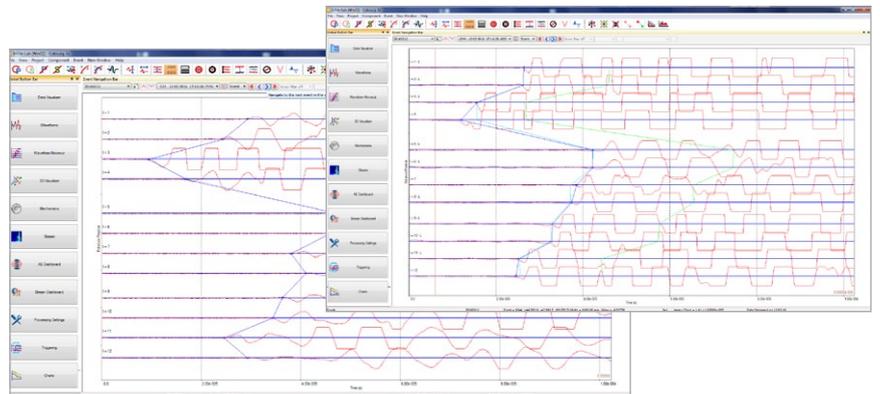


Fig 7. Time domain traces with auto picking

## Why Buy GDS?

### GDS have supplied equipment to over 75% of the world's top 50 Universities:

GDS have supplied equipment to over 75% of the world's top 50 Universities who specialise in Civil & Structural Engineering, according to the "QS World University Ranking 2017" report.

GDS also work with many commercial laboratories including BGC Canada, Fugro, GEO, Geolabs, Geoteko, Golder Associates, Inpijn Blokpoel, Klonn Crippen, MEG Consulting, Multiconsult, Statens Vegvesen, NGI, Ramboll, Russell Geotechnical Innovations Ltd, SA Geolabs, SGS, Wiertsema and Partners to name a few.

**TOP  
50**

### Would you recommend GDS equipment to your colleague, friend or associate?

**100% of our customers answered "YES"**

Results from our post-delivery survey asked customers for feedback on their delivery, installation (if applicable), supporting documentation, apparatus and overall satisfaction with GDS. The survey ran for two years.



### Made in the UK:

All GDS products are designed, manufactured and assembled in the UK at our offices in Hook. All products are quality assured before they are dispatched.

GDS are an ISO9001:2015 accredited company. The scope of this certificate applies to the approved quality administration systems relating to the "Manufacture of Laboratory and Field Testing Equipment".

**40 YEARS OF  
BRITISH  
INNOVATION** 

### Extended Warranties:

All GDS apparatus are covered by a 12 month manufacturers warranty. In addition to the standard warranty, GDS offer comprehensive extended warranties for 12, 24 and 36 months, for peace of mind against any repairs in the future. The extended warranties can be purchased at any time during the first 12 months of ownership.



### GDS Training & Installation:

All installations & training are carried out by qualified engineers. A GDS engineer is assigned to each order throughout the sales process. They will quality assure the apparatus prior to shipping, if installation has been purchased, install the apparatus on the customers site & provide the training.



### Technical Support:

GDS understand the need for ongoing after sales support, so much so that they have their own dedicated customer support centre. Alongside their support centre GDS use a variety of additional support methods including remote PC support, product helpsheets, video tutorials, email and telephone support.

