

Electronic Initiators



Electronic initiation systems enable functions that traditional pyrotechnic systems lack. Besides the immediately obvious benefits of reduced environmental impacts such as blast induced vibration and overpressure (air blast as a result of scatter); the systems increased timing control allows for accurate blast modelling and optimisation of the initiation sequence before triggering the blast.

This increased functionality affords the advanced user the opportunity to utilise accurate blast timing to optimise the outcome of the blasting process. As a result, the downstream mining processes benefit hugely making the entire mining cycle much more cost efficient.

Leading mining companies across the globe have come to realise the substantial cost benefits which AEL electronic detonators provide where they are applied in this manner. AEL Intelligent Blasting have extensive experience in providing the electronic detonator solution for your specific mining need and can assist in optimising your blast designs to enhance value through precision blasting.



The AEL series of electronic initiating systems is safe and robust. All our electronic detonator systems are designed to eliminate unintended initiation. The systems use safety keys, which now also include Near Field Communication (NFC) contactless smart cards, with encrypted codes which ensure that only authorised personnel can initiate the systems. The detonator and control equipment designs are subjected to stringent, internationally recognised safety tests, before release to the market.

To cope with the mining industry's varied mining environments, AEL's electronic detonator systems are extremely diverse, making them ideal to use in both the simplest and toughest situations. These include tunnelling, shaft sinking, underground stoping and all forms of surface mining environments.



Electronic DIGISHOT®

DigiShot® is an easy-to-use, reliable, electronic initiating system for use primarily in smaller blasting operations that demand accurate timing. Examples include environmentally sensitive operations such as quarrying, tunnelling operations and smaller civil blasts. The DigiShot® electronic initiation system represents an innovative advance in technology which enables users to achieve the accurate timing benefits of electronic initiation systems with robust all-weather downlines and surface connectors. As an added benefit, the ability to blast wirelessly has now been included in this system.

APPEARANCE

The detonator shell is copper with 2 wires covered in a robust red polymer with an extremely high breaking strain. Deployment is via the proven heat-shrink coil deployment system.

APPLICATION

DigiShot® system is used:

- **Underground:** Massive, tunneling
- **Surface:** opencast, open pit, quarrying, construction

FEATURES

- Rugged reliability
- Highly resistant to stray currents
- Designed to be initiated by firing equipment specifically designed for the DigiShot® system
- Remote firing capability
- Multiple blast capability
- Synchronisation capability

BENEFITS

- High accuracy
- Minimal on-bench components to simplify use
- Automatic or programmable delay timing
- Full functionality testing at safe voltage
- Electronic logs of every interaction on the equipment are kept, which provides a useful tool to the manager to monitor and investigate blast history

SAFETY BENEFITS

DigiShot® detonator assemblies cannot be initiated by:

- Radio transmissions
- Radiations
- Stray currents
- Static discharge
- Conventional initiation units [e.g. shot exploders]



INITIATION

DigiShot® detonator assemblies can be programmed/initiated by any of the following dedicated DigiShot® systems:

- CE4 Tagger
- V8 Tagger
- DigiShot® Blaster

SPECIAL PRECAUTIONS

- Handle with care; damage to clip, wire or detonator could lead to misfires
- Never carry DigiShot® assemblies by holding onto the detonator
- Always keep detonators pointing away from you
- Severe impact on the detonator can result in an explosion
- Never pull the wires off the assemblies
- Never connect the blast until all the charging operations have been completed
- Ensure that the detonator is in intimate contact with the explosive column for reliable initiation

STORAGE

- The shelf life of the product is 36 months from the date of manufacture
- Store in moderate temperatures and dry conditions in a well-ventilated magazine
- Abide by the legal storage requirements for the region
- Temperatures above 90 °C may result in spontaneous explosion
- Always rotate stock (first in, first out)

PACKAGING (17 kg GROSS)

| LENGTH (m) | 1.1 B | | 1.4 S | |
|------------|----------------|----------|----------------|----------|
| | UNITS PER CASE | NEQ (kg) | UNITS PER CASE | NEQ (kg) |
| 1.8 | 120 | 0.12 | 42 | 0.04 |
| 3 | 102 | 0.10 | 42 | 0.04 |
| 6 | 66 | 0.07 | 42 | 0.04 |
| 10 | 60 | 0.06 | 48 | 0.05 |
| 12 | | | 36 | 0.04 |
| 15 | 42 | 0.04 | 36 | 0.04 |
| 20 | 30 | 0.03 | 30 | 0.03 |
| 24 | 30 | 0.03 | 24 | 0.02 |
| 25 | 30 | 0.03 | 24 | 0.02 |
| 30 | 24 | 0.02 | 24 | 0.02 |
| 40 | 18 | 0.02 | 18 | 0.02 |
| 50 | 12 | 0.01 | 12 | 0.01 |
| 60 | 12 | 0.01 | 12 | 0.01 |

Other wire lengths available on request

PRODUCT INFORMATION**DIGISHOT® DETONATOR**

| | | |
|---|--|-------------|
| Dynamic Shock Resistance | ≤15954.15 Psi/110 MPa | |
| ESD Resistance | >1 Joule Energy @ 30 KV | |
| RF Immunity | Passes CEN TS 13763-27 | |
| Detonator Shell | Copper: l: 93.75 mm-94.25 mm, OD: 7.49 mm-7.54 mm | |
| Applicable Standards | SANS 1717-1: The South African National Standard for: The design approval of EDD initiation systems for use in mining and civil blasting applications. CEN TS13763-27: European CEN-testing specification for Explosives civil use-Detonators and relays. | |
| Detonator Strength | 8 | |
| Base Charge | PETN | |
| Net Explosives Quantity (NEQ) | 1g/detonator | |
| Timing | Programmable | |
| Wire | Rugged, red, over extruded | |
| Connector | Rugged, water resistant | |
| Elongation (Tested @ 21 °C) | Steel wire | Copper wire |
| | < 3 % | >25 % |
| Tensile Strength (Tested @ 21 °C) | Steel Wire | Copper Wire |
| | > 500 N | > 200 N |
| Abrasion Strength | Passes CEN TS 13763-27 | |
| Detonator Shell Marking | Dangerous-Blasting Cap-Explosive Danger-Detonateur-Explosif | |
| In-Hole Sleep time | A maximum of 7 days (when tested in 100 % diesel, 500 Kpa pressure and starting temperature of 60 °C/140 °F-end temperature of (25 °C/177 °F) | |
| Accuracy | ± 1 ms for blast durations of less than 5 seconds | |
| Detonator Temperature Limits <small>* Detonator is suitable for hot emulsion application</small> | -40 °C to +80 °C | |

Transport (UN Classification)

Standard Packaging: Class 1.1B, UN no. 0030, DETONATORS, ELECTRIC for blasting

Special Packaging: Class 1.4S, UN no. 0456, DETONATORS, ELECTRIC for blasting



ELECTRONIC DETONATOR

Digishot® Plus

DigiShot® Plus is the flagship system in electronic detonators. It is an easy-to-use, reliable, electronic initiating system with remote firing capability and can be extended to fire very large blasts.

The user can link several systems together through an RF link to fire multiple large benches in a synchronised or offset manner. The detonator connector system has been improved over several years of continuous use and offers a truly reliable and robust connection mechanism.

APPEARANCE

The detonator shell is copper with 2 wires covered in a robust green polymer with an extremely high breaking strain. Deployment is via the proven heat-shrink coil system.

APPLICATION

DigiShot® Plus system is used:

- **Surface:** for use in quarries, opencast/open pit large scale blasting

FEATURES

- Rugged reliability
- Highly resistant to stray currents
- Designed to be initiated by firing equipment specifically designed for the DigiShot® Plus system
- Remote firing capability
- Multiple blast capability
- Bench Box synchronisation capability for expanded blast patterns or multiple bench blasting

BENEFITS

- High accuracy
- Minimal on-bench components to simplify use
- Automatic or programmable delay timing
- Full functionality testing at safe voltage
- Electronic logs of every interaction on the equipment are kept, which provides a useful tool to the manager to monitor and investigate blast history



SAFETY BENEFITS

DigiShot® Plus detonator assemblies cannot be initiated by:

- Radio transmissions
- Radiations
- Stray currents
- Static discharge
- Conventional initiation units (e.g. shot exploders)

INITIATION

DigiShot® Plus detonator assemblies can be programmed/initiated by any of the following dedicated DigiShot® Plus systems:

- CE4 Tagger
- V8 Tagger
- DigiShot® Blaster

SPECIAL PRECAUTIONS

- Handle with care; damage to clip, wire or detonator could lead to misfires
- Never carry DigiShot® Plus assemblies by holding onto the detonator
- Always keep detonators pointing away from you
- Severe impact on the detonator can result in an explosion
- Never pull the wires off the assemblies.
- Never connect the blast until all the charging operations have been completed
- Ensure that the detonator is in intimate contact with the explosive column for reliable initiation

STORAGE

- The shelf life of the product is 36 months from the date of manufacture
- Store in moderate temperatures and dry conditions in a well-ventilated magazine
- Abide by the legal storage requirements for the region
- Temperatures above 90 °C may result in spontaneous explosion
- Always rotate stock (first in, first out)

PACKAGING (17 kg GROSS)

| LENGTH (m) | 1.1 B | | 1.4 S | |
|------------|----------------|----------|----------------|----------|
| | UNITS PER CASE | NEQ (kg) | UNITS PER CASE | NEQ (kg) |
| 1.8 | 120 | 0.12 | 50 | 0.05 |
| 3 | 102 | 0.10 | | |
| 6 | 66 | 0.07 | 48 | 0.05 |
| 10 | 60 | 0.06 | 48 | 0.05 |
| 15 | 42 | 0.04 | 36 | 0.04 |
| 20 | 30 | 0.03 | 30 | 0.03 |
| 25 | 30 | 0.03 | 24 | 0.02 |
| 30 | 24 | 0.02 | 24 | 0.02 |
| 35 | 18 | 0.02 | 18 | 0.02 |
| 40 | 18 | 0.02 | 18 | 0.02 |
| 45 | 12 | 0.01 | 12 | 0.01 |
| 50 | 12 | 0.01 | 12 | 0.01 |
| 60 | 12 | 0.01 | 12 | 0.01 |

Other wire lengths available on request

PRODUCT INFORMATION**DIGISHOT® PLUS DETONATOR**

| | | | |
|---|--|------------------------|-------------------|
| Dynamic Shock Resistance | ≤ 15954.15 Psi/110 MPa | | |
| ESD Resistance | >1 Joule Energy @ 30 KV | | |
| RF Immunity | Passes CEN TS 13763-27 | | |
| Detonator Shell | Copper: l: 93.75 mm-94.25 mm, OD: 7.49 mm-7.54 mm | | |
| Applicable Standards | SANS 1717-1: The South African National Standard for: The design approval of EDD initiation systems for use in mining and civil blasting applications. CEN TS13763-27: European CEN-testing specification for Explosives civil use-Detonators and relays. | | |
| Detonator strength | 8 | | |
| Base Charge | PETN | | |
| Net Explosives Quantity (NEQ) | 1g/detonator | | |
| Timing | Programmable | | |
| Wire | Rugged, red, over extruded | | |
| Connector | Rugged, water resistant | | |
| Elongation (Tested @ 21 °C) | Steel wire < 3 % | Copper wire >25 % | Bimetal >20 % |
| Tensile Strength (Tested @ 21 °C) | Steel Wire > 500 N | Copper Wire > 200 N | Bimetal >400 N |
| Abrasion Strength | Passes CEN TS 13763-27 | | |
| Detonator Shell Marking | Dangerous-Blasting Cap-Explosive Danger-Detonateur-Explosif | | |
| In-Hole Sleep time | A maximum of 7 days (when tested in 100 % diesel, 500 Kpa pressure and starting temperature of 60 °C/140 °F-end temperature of (25 °C/177 °F) | | |
| Accuracy | ± 1 ms for blast durations of less than 5 seconds | | |
| Detonator Temperature Limits <small>* Detonator is suitable for hot emulsion application</small> | -40 °C to +80 °C | | |

Transport (UN Classification)

Standard Packaging: Class 1.1B, UN no. 0030, DETONATORS, ELECTRIC for blasting
 Special Packaging: Class 1.4S, UN no. 0456, DETONATORS, ELECTRIC for blasting

Electronic- Equipment

INTELLISHOT™ SYSTEM

The IntelliShot™ system is taking the future of mining to the next level. It is a superior advanced blasting system and is easy to use, ensuring the best blast, on time, every time.

It provides the user with several unique features and is housed in a robust casing that stands up well to the harsh user environment.

The Commander™ unit can be programmed in Bench, Base or Repeater mode.

APPEARANCE

The IntelliShot™ Blast Commander™ is housed in a rugged yellow and black casing rubberised in certain areas to help absorb impact during handling. It contains a high detail LCD display screen and a tactile touch pad. The unit weighs about 2.0 kg.

APPLICATION

IntelliShot™ system is used:

Underground: Massive, tunneling

Surface: opencast, open pit, quarrying, construction

FEATURES

This is a multi-purpose device that is used as a Bench Commander™, repeater or Base Commander™, and it controls the entire blast.

- Limits user interface through: automatic detonator detection, testing and fast programming
- Wirelessly controlled by the CE4 Tagger or optional ruggedized
- Up to 10 Commanders can be deployed for a single blast using long distance RF communication from a blasting point
- It has four channels that can connect to 400 detonators, giving a total capacity of 1600 detonators per Commander™
- By verifying that there is sufficient voltage at the last detonator of a detonator string, it can blast through higher levels of leakage
- Boasts a unique and robust design, with a built-in long-range antenna, that can handle the harshest mining conditions



BENEFITS

- Unique features prevent blast delays and speeds up blast deployment to ensure successful blasts
- Unique electronic ID assists with control and tracking of units
- Next generation of control equipment with enhanced features

SAFETY BENEFITS

IntelliShot™ system is:

- Autonomous detection and testing of detonators
- Wirelessly controlled through the multi-purpose CE4 Tagger
- Detonator energy monitoring right up to the point of blasting
- Pin protected
- The blast is initiated with contactless NFC (Near Field Communication) Blast Cards
- On bench fault detection simplified with the GPS location of the detonator hole position in the Tagger

SPECIAL INSTRUCTIONS

- IntelliShot™ system should only be used by users who have completed both product specific training successfully and who comply with the applicable local regulatory requirements
- IntelliShot™ control equipment and detonators are **ONLY** suitable for use within other IntelliShot™ components as a system-no other equipment should be connected to IntelliShot™ detonators and no IntelliShot™ equipment should be connected to a non-IntelliShot™ detonator of any type
- IntelliShot™ control equipment batteries should be kept in a charged state. If the equipment is to be stored for extended periods, the batteries may need to be removed or replaced
- All equipment in the field must be returned to AEL or its repair centres for service in the following intervals:
 - Handheld equipment (Taggers, etc.):** 18 months
 - Other equipment (excl. accessories):** 24 months

| PRODUCT INFORMATION | |
|--|---|
| INTELLISHOT™ | |
| Applicable Standards | <p>SANS 1717-1: The South African National Standard for: The design of detonator initiation systems for use in mining and civil blasting applications Part 1: Electronic initiation systems</p> <p>CEN/TS13763-27: European CEN-technical specification for Explosives for civil uses-Detonators and relays-Part 27: Definitions, methods and requirements for electronic initiation systems</p> |
| Temperature Limits (Operational) (Tagger LCD when exposed for 1 hr) | -10 °C to +50 °C |
| Battery-Internal, not field replaceable | 3.7 V Lithium Polymer |
| Weight | Approximately 2.0 kg |
| Display (Active LCD area with backlight) | 200 pixels x 96 pixels/45,80mm x 21,98mm |
| Keypad | Tactile touch pad with numeric soft-keys |
| External Connections | 4 sets of terminals to connect to 2 wire detonator harnesses |
| Operating Time from a Fully Charged Battery | Approximately 8 hrs at 25 °C. Operating time is influenced by detonator load, backlight setting and operating temperature |
| Water/Dust Resistance | IP 57 |

| WIRELESS LINK SPECIFICATIONS | |
|-------------------------------------|---|
| Remote Frequency Bands South Africa | 902-928 MHz |
| RF Range | Up to 3 km line of sight |
| Repeater Options | Commander can be reprogrammed as a repeater |
| RF Technology | Frequency Hopping Spread Spectrum (FHSS) |
| Transmitter Output Power | Variable up to 1 000 mW (30 dBm) |
| Antenna Gain | 2 dBi |
| Regulatory | FCC-15.247 |

| SYSTEM LIMITS | |
|---|--|
| Maximum Total Delay Time | 20 000 ms |
| Maximum Number of Detonators | 1600 Single Commander mode 16000 Multiple Commander linked mode |
| Maximum Surface Harness | Should not exceed 2500 m |
| Maximum Number of synchronized IntelliShot™ Commanders, RF mode | 11 total-1 Base 10 Bench |
| Maximum Wi-Fi distance from tagger to the Commander™ | 10 m |

OPTIONAL ACCESSORIES-NOT SUPPLIED (ORDER SEPARATELY)

- **Tablet**-Ruggedized tablet with dedicated IntelliShot™ software
- **Case**-Nanuk™ 940 case with foam inner
- **Base Plate**-Magnetically coupled to assist in standing upright on uneven surfaces
- **Harness Wire**-0.63 mm twisted pair copper wire with PVC or Polyethylene insulation available in 200 m and 500 m spools
- **Blast Cards (additional or replacement)**-For safety purposes the system is activated through a pre-programmed personal identification of the blaster and a unique password (PIN).

The system deploys two types of NFC blast cards that are identified by a Yellow or Red colour. Scan the Yellow blast card on the Bench Commander™ after completion of connecting and testing of the blast installation (and the bench has been cleared of all personnel) to place the Bench Commander™ in a waiting blast command state. Scan the Red blast card at the Base Commander™ during an RF multi-bench Commander™ blast, or at the Bench Commander™ during a local blast to perform the arm and fire commands)

OPTIONAL SOFTWARE AVAILABLE

- **ViewShot®** blast timing software allows blasting plans to be designed and simulated on a computer that can be directly downloaded into the control equipment
- **LogShot™** is a desktop Windows PC application that is mainly used to download and display logs from control equipment following a blast

Electronic- Detonator INTELLISHOT™

IntelliShot™ is an easy-to-use, reliable, electronic initiating system for use primarily in smaller blasting operations that demand accurate timing. Examples include environmentally sensitive operations such as quarrying, tunnelling operations and smaller civil blasts. The IntelliShot™ electronic initiation system represents an innovative advance in technology which enables users to achieve the accurate timing benefits of electronic initiation systems with robust all-weather downlines and surface connectors. As an added benefit, the ability to blast wirelessly has now been included in this system.

APPEARANCE

The detonator shell is copper with 2 wires covered in a robust black polymer with an orange stripe. Deployment is via the proven heat-shrink coil deployment system.

APPLICATION

IntelliShot™ system is used:

Underground: Massive, tunneling

Surface: opencast, open pit, quarrying, construction

FEATURES

- Rugged reliability
- Highly resistant to stray currents
- Designed to be initiated by firing equipment specifically designed for the IntelliShot™ system
- Remote firing capability
- Multiple blast capability
- Commander™ synchronisation capability for expanded blast patterns or multiple bench blasting

BENEFITS

- High accuracy
- Minimal on-bench components to simplify use
- Automatic or programmable delay timing
- Full functionality testing at safe voltage
- Electronic logs of every interaction on the equipment are kept, which provides a useful tool to the manager to monitor and investigate blast history



SAFETY BENEFITS

IntelliShot™ detonator assemblies cannot be initiated by:

- Radio transmissions
- Radiations
- Stray currents
- Static discharge
- Conventional initiation units (e.g. shot exploders)

INITIATION

IntelliShot™ detonator assemblies can be programmed/initiated by any of the following dedicated IntelliShot™ systems:

- CE4 Tagger
- IntelliShot™ Commanders

SPECIAL PRECAUTIONS

- Handle with care; damage to connector clip, wire or detonator could lead to misfires
- Never carry IntelliShot™ assemblies by holding onto the detonator
- Always keep detonators pointing away from you
- Severe impact on the detonator can result in an explosion
- Never pull the wires off the assemblies
- Never connect the blast until all the charging operations have been completed
- Ensure that the detonator is in intimate contact with the explosive column for reliable initiation

STORAGE

- The shelf life of the product is 36 months from the date of manufacture
- Store in moderate temperatures and dry conditions in a well-ventilated magazine
- Abide by the legal storage requirements for the region
- Temperatures above 90 °C may result in spontaneous explosion
- Always rotate stock (first in, first out)

| PACKAGING (17 kg GROSS) | | | | |
|-------------------------|----------------|----------|----------------|----------|
| Length (m) | 1.1 B | | 1.4 S | |
| | Units per case | NEQ (kg) | Units per case | NEQ (kg) |
| 1.8 | 120 | 0.12 | 50 | 0.05 |
| 3 | 102 | 0.10 | | |
| 6 | 66 | 0.07 | 48 | 0.05 |
| 10 | 60 | 0.06 | 48 | 0.05 |
| 15 | 42 | 0.04 | 36 | 0.04 |
| 20 | 30 | 0.03 | 30 | 0.04 |
| 25 | 30 | 0.03 | 24 | 0.02 |
| 30 | 24 | 0.02 | 24 | 0.02 |
| 35 | 18 | 0.02 | 24 | 0.02 |
| 40 | 18 | 0.02 | 18 | 0.02 |
| 45 | 12 | 0.01 | 12 | 0.01 |
| 50 | 12 | 0.01 | 12 | 0.01 |
| 60 | 12 | 0.01 | 12 | 0.01 |

Other wire lengths available on request

| PRODUCT INFORMATION | |
|--|---|
| INTELLISHOT™ DETONATOR | |
| Dynamic Shock Resistance | ≤ 15954.15 Psi/110 MPa |
| ESD Resistance | >1 Joule Energy @ 30 KV |
| RF Immunity | Passes CEN TS 13763-27 |
| Detonator Shell | Copper: l: 93.75 mm-94.25 mm, OD: 7.49 mm-7.54 mm |
| Applicable Standards | SANS 1717-1: The South African National Standard for: The design approval of EDD initiation systems for use in mining and civil blasting applications. CEN TS13763-27: European CEN-testing specification for Explosives civil use-Detonators and relays |
| Detonator Strength | 8 |
| Base Charge | PETN |
| Net Explosives Quantity (NEQ) | 1g/detonator |
| Timing | Programmable 0-20 000 ms |
| Wire | Rugged, black with orange stripe, over extruded |
| Connector | Rugged, water resistant |
| Elongation (Tested @ 21 °C) | Minimum of 20 % @ 21 °C |
| Tensile Strength (Tested @ 21 °C) | Not less than 400 N |
| Abrasion Strength | Passes CEN TS 13763-27 |
| Detonator Shell Marking | Dangerous-Blasting Cap-Explosive Danger-Detonateur-Explosif |
| In-Hole Sleep time | 21 days (when tested in 100 % diesel, 1000 Kpa pressure at a temperature of 25 °C (177 °F)) |
| Accuracy | ± 1ms for blast durations of less than 5 seconds |
| Detonator Temperature Limits | -40 °C to +80 °C |
| * Detonator is suitable for hot emulsion application | |

Transport (UN Classification)

Standard Packaging: Class 1.1B, UN no. 0030, DETONATORS, ELECTRIC for blasting

Special Packaging: Class 1.4S, UN no. 0456, DETONATORS, ELECTRIC for blasting

NetShock™

ELECTRONIC INITIATORS



NetShock™ is a purpose designed device that links the cost benefits of traditional shock tube systems with those of electronic centralised blasting systems without the need to switch to electronic detonators.

APPEARANCE

An aluminium tube which contains an electronic detonator assembly with an integrally moulded clip allowing easy connection to shock tubes.

APPLICATION

NetShock™ system is used:

- **Underground:** Narrow Reef Massive, Tunnelling, Stoping

BENEFITS

- Conveys real time in-stope intelligence and reports to the central management workstation
- Safety benefits of NetShock™ initiators include protection to over voltages, electrostatic discharge and unauthorised use as the detonator requires a specific coded signal to fire
- The design of the system allows full testability down to detonator level. As a result misfires can be totally eliminated before blasting time. Maximizes the opportunity for blasting all panels

SAFETY BENEFITS

NetShock™ detonator assemblies cannot be initiated by:

- Radio transmissions
- Radiations
- Stray currents
- Static discharge
- Conventional initiation units (e.g. shot exploders)

FEATURES

- Provides the mines with computer-driven Remote firing capability centralised blasting functionality for conventional shock tube systems
- Designed to be used with the AEL centralised blasting system

INITIATION

NetShock™ detonator assemblies can be programmed/initiated by any of the following dedicated NetShock™ systems:

- AEL centralised blasting system

SPECIAL PRECAUTIONS

- Handle with care; damage to connector clip, wire or detonator could lead to misfires
- Never carry NetShock™ assemblies by holding onto the detonator
- Always keep detonators pointing away from you
- Severe impact on the detonator can result in an explosion
- Never pull the wires off the assemblies.
- Never connect the blast until all the charging operations have been completed
- Ensure that the detonator is in intimate contact with the explosive column for reliable initiation

STORAGE

- The shelf life of the product is 36 months from the date of manufacture
- Store in moderate temperatures and dry conditions in a well-ventilated magazine
- Abide by the legal storage requirements for the region
- Temperatures above 90 °C may result in spontaneous explosion
- Always rotate stock (first in, first out)

| PRODUCT SERIES | |
|--|---|
| NETSHOCK™ DETONATOR | |
| Dynamic Shock Resistance | N/A |
| ESD Resistance | >1 Joule Energy @ 30 KV |
| RF Immunity | Passes CEN TS 13763-27 |
| Detonator Shell | Copper: L: 93.75 mm-94.25 mm, OD: 7.49 mm-7.54 mm |
| Applicable Standards | SANS 1717-1: The South African National Standard for: The design approval of EDD initiation systems for use in mining and civil blasting applications. CEN TS13763-27: European CEN-testing specification for Explosives civil use-Detonators and relays |
| Detonator Strength | 8 |
| Base Charge | PETN |
| Net Explosives Quantity (NEQ) | 1g/detonator |
| Timing | Not Programmable 0 ms |
| Wire | Rugged, green over extruded |
| Connector | Rugged, water resistant |
| Elongation (Tested @ 21 °C) | < 3 % |
| Tensile Strength (Tested @ 21 °C) | Not less than 500 N |
| Abrasion Strength | Passes CEN TS 13763-27 |
| Detonator Shell Marking | None-Orange Clip on end |
| Detonator Temperature Limits * Detonator is suitable for hot emulsion application | -40 °C to +80 °C |

CE 4 Tagger

ELECTRONIC EQUIPMENT

The CE4 Tagger is a replacement for the existing V8 electronic delay detonator tagging device.

It provides the user with several updated features and is housed in an improved robust casing that stands up well to the harsh user environment. The power management system has been improved giving extended battery life.

The upgraded LCD display is easier to read and can display more information at once. The touch pad has been upgraded from a flat pad to raised silicone buttons with backlighting, providing improved tactile feedback to the user when inputting information, especially when wearing gloves. A vibration user feedback has been added along with variable tone audio speakers which improve user error communications vastly. The IP rating has been improved to the point that it can be immersed under 1 m of water and remains fully functional afterwards.

GPS capability has been added as well as other features useful to blasting personnel. The CE4 Tagger is loaded with the appropriate software for the product being used so that the user interface between different products remains familiar.

APPEARANCE

The CE4 Tagger is housed in a rugged yellow and black casing rubberised in certain areas to help absorb impact during handling. It contains a high detail LCD display screen and a rubberised and backlit raised silicone keypad. The unit weighs about 600 g.

BENEFITS

- Unique electronic ID assists with control and tracking of units
- Next generation of control equipment with enhanced features

FEATURES

- Vastly improved user interface
- Scratch resistant screen
- Toughened device for use in harsh environments
- Ease of use

APPLICATION

- All areas of electronic detonator use
- Applicable to all AEL series of electronic detonators



SAFETY BENEFITS

CE4 Tagger is:

- Password protected
- Used for on-bench operations such as:
 - assigning detonator locations
 - testing communication
 - leakage of detonator installation
 - verification of desired blast layout
- Inherently safe and cannot initiate electronic detonators as:
 - maximum battery voltage is below minimum required blasting voltage
 - it is not able to issue the encrypted blasting command (i.e. ARM and FIRE commands)

SPECIAL INSTRUCTIONS

- CE4 Tagger should only be used by users who have completed both product specific training successfully and who comply with the applicable local regulatory requirements. The CE4 Taggers are suitable for use within the AEL series of electronic initiation systems- the tagger is not compatible with any other system.
- It is recommended that the CE4 Tagger be charged to 100 % before use, to allow for maximum operating time. However, should the Tagger be stored for an extended period of time, it is recommended that the Tagger be charged to approximately 50 %. Thereafter the unit should be charged at least every three months, to 50 %, to maintain the expected lifetime of the battery. Store the Tagger in a cool, dry place when not in use.
- All equipment in the field must be returned to AEL or its repair centres for service in the following intervals:
 - Handheld equipment (Taggers, etc.): 18 months

PRODUCT SERIES

CE4 TAGGER

| | |
|--|--|
| Applicable Standards | <p>SANS 1717-1: The South African National Standard for: The design of detonator initiation systems for use in mining and civil blasting applications Part 1: Electronic initiation systems</p> <p>CEN/TS13763-27: European CEN-technical specification for Explosives for civil uses–Detonators and relays–Part 27: Definitions, methods and requirements for electronic initiation systems</p> |
| Temperature Limits (Operational) (Tagger LCD when exposed for 1 hr) | -30 °C to +60 °C |
| Battery-Internal, not Field Replaceable | 3.7 V Lithium Polymer |
| Battery-External Battery Pack (not incl.) | 6x1.5 V AA Alkaline or 6x1.2V Ni-MH/Ni-Cd |
| Weight of Tagger with Head | Approximately 560 g |
| Weight of External Battery Pack | Approximately 140 g |
| Dimensions: Tagger with Head | l: 213mm w: 88mm h: 38mm |
| Dimensions: External Battery Pack | l: 180mm w: 85mm h: 27mm |
| Display (Active LCD area with backlight) | 128 pixels x 128 pixels/44.78 mm x 44.78 mm |
| Keypad | Backlit tactile silicone keypad with alphanumeric keys |
| External Connections | A series of connections exist for different applications purposes. Replaceable Tagger to Detonator Connector head. USB Connector for data extraction and charging. |
| Operating Time from a Fully Charged Battery | Approximately 10 hrs at 25 °C. Operating time is influenced by detonator load, backlight setting and operating temperature. At temperatures below -15 °C battery life may be reduced significantly. |
| Software Upgrades | Software upgrade is via USB connector on the Tagger and a flash drive |
| Water Resistance | IP 57 |

INCLUDED IN THE BOX

- CE4 Tagger with tagger head installed (Head will depend on software specified on order)
- Application software installed (Specify type on order)
- AC Charger, DC charger and various plug connectors
- USB Type A to mini USB charger/data cable

OPTIONAL ITEMS NOT SUPPLIED (ORDER SEPARATELY)

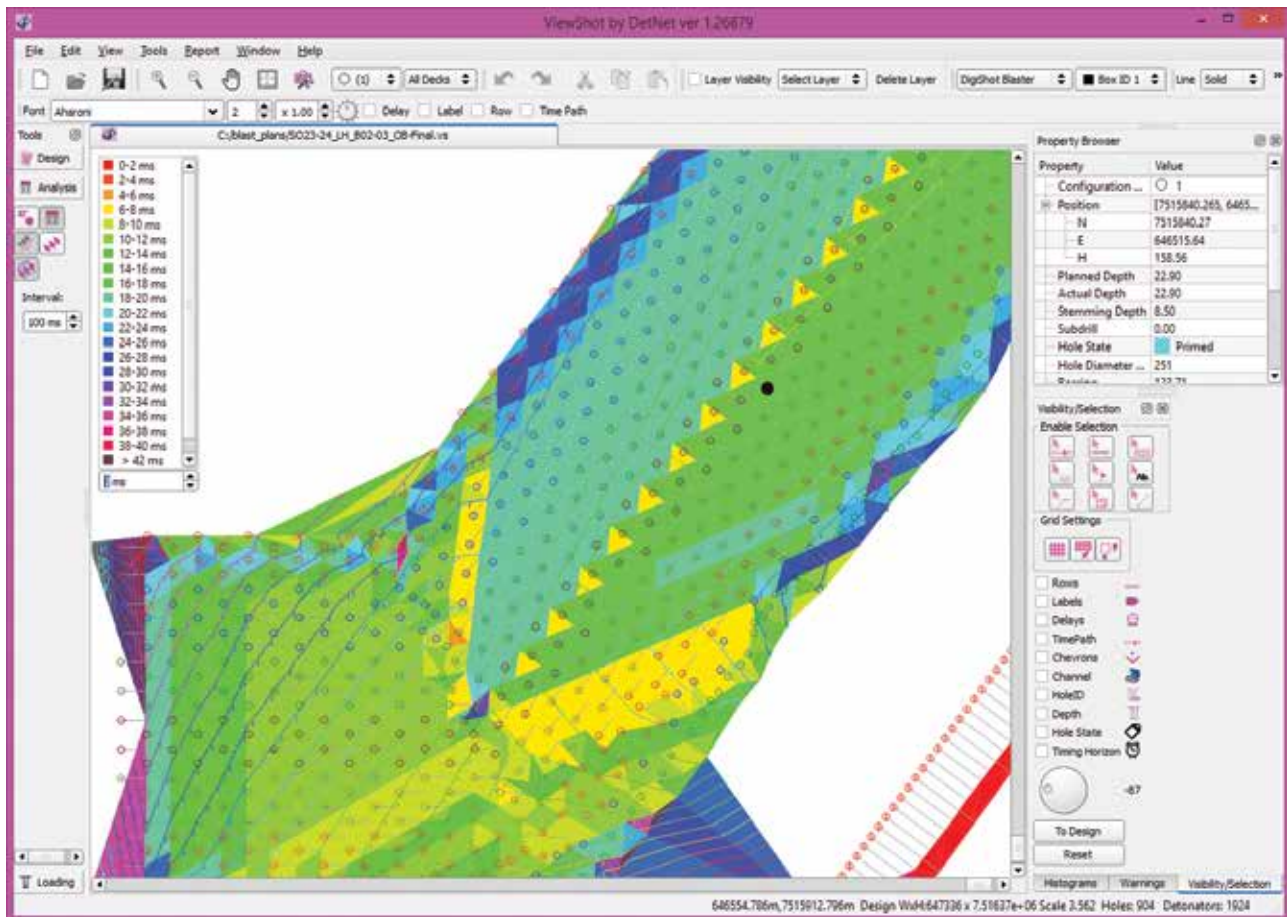
- Additional tagger heads

OPTIONAL SOFTWARE AVAILABLE VIA DETNET PORTAL

- Tagger firmware updates
- Log Extractor Software
- PC Application for screen captures
- Tickets to reset forgotten passwords and selected factory settings

ViewShot™

ELECTRONIC DETONATOR BLAST TIMING SOFTWARE



ViewShot™ is a software package designed for interfacing blast designs with DigiShot® and DigiShot® Plus firing equipment. It provides the user with the ability to design complex and detailed blast designs and interrogate the timing design before the blast takes place.

When using ViewShot™ the blast timing does not have to be uploaded manually which saves time. The user can apply the timing design to the detonators right up to the point where it becomes necessary to blast. This means that last minute changes to the timing can be done without the need to re-visit the detonators deployed in the blast area.

The ViewShot™ blast design software package allows blasting plans to be designed and simulated on a computer that can be directly downloaded into the control equipment. This enables the user to save substantial time during the blasting process.

BENEFITS

- Allows fast and convenient upload of detonator timing to your pre-loaded blast
- Allows viewing of the blast firing sequence on a PC and changing of blast timing to optimise blast outcomes

FEATURES

- Provides the user with the ability to change detonator timing to the moment before the actual blast programming starts
- Provides the ability to ensure single hole firing and minimise maximum instantaneous charge firing per blast

MINING METHOD

- All

VIEWSHOT™ 3D

ELECTRONIC DETONATOR BLAST TIMING SOFTWARE

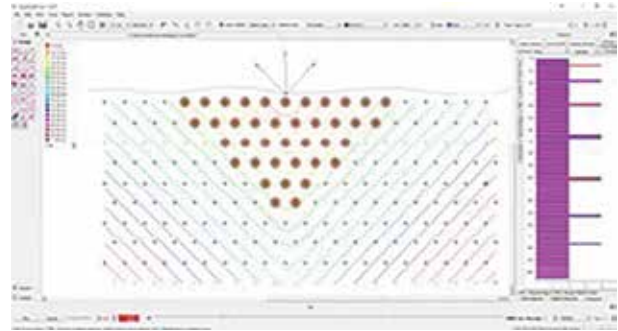
The new ViewShot™ 3D blast software facilitates the planning, design and simulation of a blast through a flexible and feature-rich user interface. Efficient blasting practices is now further enhanced with ViewShot™ 3D's ability to optimise blast outcomes with advanced modelling and simulation features. ViewShot™ 3D seamlessly integrates with third party mine planning and reporting software. ViewShot™ 3D interfaces with DigiShot® and DigiShot® Plus and IntelliShot™.

APPEARANCE

- All areas of electronic detonator use
- Applicable to all AEL series of electronic detonators

FEATURES

- Visualization of the loading model
 - Positioning of decks and detonators in the hole
- Calculate the Energy Map distribution
 - Horizontal Section
 - Vertical Section
- Calculate and visualize the Peak Particle Velocity Map
- Optimization of delays
 - Time of arrival at monitoring points
 - Signature hole analysis
- Fragmentation prediction
- Enhanced blast optimisation with an Energy Map
- The software is now capable of 3D visualisation on:
 - Deck composition
 - Delays
 - Hole ID
- Animated simulation of blast timing



BENEFITS

- Allows fast and convenient upload of detonator timing to your pre-loaded blast
- Allows viewing of the blast firing sequence on a PC and changing of blast timing to optimise blast outcomes
- Blast optimization regarding delay, explosives charge, fragmentation and cost

VIEWSHOT™ 3D TOOLBOX AND ATTRIBUTES:

- Design a blast using a template, actual survey data or a detonator list from a Tagger
- It provides a flexible Hole Configuration tool that supports various combinations of decking and charging
- ViewShot™ 3D provides the user with optimisation tools to control the number of holes firing at a certain delay to facilitate single-hole firing
- The user may design delays for each deck separately by targeting specific decks in chevron patterns, in manual or semi-automated mode
- The ViewShot™ 3D interface may be customised to fit the user layout requirements
- Blast design parameters include hole diameters, explosives material, rock type and more
- Formulate timing designs based on actual hole positions
- Create hole-charge templates using a built-in explosives database which contains actual explosives data
- Calculate costs based on blast parameters and the built-in explosives database
- Multiple deck capability for designing specialised blasts e.g. through-seam blasting
- Detailed reporting including charge sheets and blast records

BlastWeb™

The BlastWeb™ electronic initiation system is designed for underground environments where there is a requirement for ease-of use, limited user interaction and centralised blasting. The BlastWeb™ electronic initiation system can initiate specific AEL electronic detonators. The main requirement is filled by NetShock™ which is used to initiate underground shock tube rounds.

The system is deployed internationally with a solid performance track record.

The BlastWeb™ system can be used as a single stand-alone system (fixed or portable) or as part of a centralised blasting network in where several BCU's are connected to a Surface Blast Controller via a mine wide communication backbone.

APPLICATION

BlastWeb® system is used:

- **Underground:** Centralised Blasting

FEATURES

The BlastWeb™ system consists of the Blast Control Unit (BCUs) and a Surface blast control PC. The BCU is installed in a suitable place underground which communicates through a copper or fibre network to a Surface blast control PC found in the control room.

- Provides pre- and post-blast diagnostics
- Includes an on-board diagnostic system for safe testing
- Timing offset between sections can be introduced for mining areas that require reduced seismicity
- The use of high security blast keys and passwords ensure that total blast safety is always under the control of the responsible person
- Boasts a unique and robust design that can handle the harshest mining conditions
- The Blast Control Unit (BCU) provides the required blast voltage and encoded signal necessary to initiate the blast



- The BCU can be powered from 110, 220, or 525 V and incorporates a battery back-up system in case of power failures
- The BCU can link via a Copper or Ethernet backbone to other BCUs and a Surface Blast Controller to form an integrated communication system which enables users to have access to real time information on all events occurring and to blast the entire installation from a central point

BENEFITS

- Pre-blast diagnosis and communication of potential safety hazards and production problems
- The scale, location and extent of the planned blasts are known before panels are centrally initiated from the surface
- The lost blast rate is significantly reduced using this system thereby minimising production losses

SAFETY BENEFITS

The BlastWeb® system:

- Computer on surface (Surface Blast Controller) that continuously communicates with BCU's at the underground work place and provides real time information on all connected components
- BlastWeb Software is secure and encrypted used for Centralised Blasting
- By removing the SmartKeys at any stage of the operation will abort the blast

SPECIAL INSTRUCTIONS

- BlastWeb® should only be used by users who have completed both product specific training successfully and who comply with the applicable local regulatory requirements
- BlastWeb® control equipment and detonators are ONLY suitable for use within other DigiShot® components as a system-no other equipment should be connected to BlastWeb® detonators and no BlastWeb® equipment should be connected to a non-BlastWeb® detonator of any type
- BlastWeb® control equipment batteries should be kept in a charged state. If the equipment is to be stored for long periods the batteries may need to be removed or replaced
- All equipment in the field must be returned to AEL or its repair centres for service in the following intervals:
 - Handheld equipment (Taggers, etc.):** 18 months
 - Other equipment (excl. accessories):** 24 months

| PRODUCT SERIES | |
|--|---|
| BLASTWEB BLAST CONTROL UNIT (BCU) | |
| Applicable Standards | <p>SANS 1717-1: The South African National Standard for: The design of detonator initiation systems for use in mining and civil blasting applications Part 1: Electronic initiation systems</p> <p>CEN/TS13763-27: European CEN-technical specification for Explosives for civil uses–Detonators and relays–Part 27: Definitions, methods and requirements for electronic initiation systems</p> |
| Temperature Limits (Operational) | -20 °C to +70 °C |
| Power Supply | 110 V; 220 V; 525 V |
| Battery–Internal, not Field Replaceable | User replaceable, rechargeable 12 V, 7.2 Ah lead acid battery |
| Display (Active LCD area with backlight) | 77.5 mmx59.0 mm |
| Keypad | Tactile touch pad with numeric soft-keys |
| Weight | Approximately 50 kg |
| Dimensions | l: 539-541 mm; w: 480-482 mm; h: 731-733 mm |
| External Connections | 6 set of terminals to connect to 2 wire detonator harnesses; SmartKey connector; USB, (RS-232 and RS-485 for expansion–rear of unit) |
| Water Resistance | Splashproof-IP 54 |

| COMMUNICATION NETWORK | |
|--|---|
| 1.8mm ² x2 Core individually screened armoured cable or Ethernet fibre backbone used between Surface Controller and BCU. | |
| BlastWeb™ Leased Line Modem (LLM) | |
| The USB Leased-line Modem is situated between the Blast Controller and the twisted pair cables going down the shaft and driven from the Blast Controller USB port. It is used to establish data communications between a blast controller, BCU and the underground components. | |
| Temperature Limits | -20 °C to +70 °C |
| Keypad | 634 g |
| Weight | Approximately 50 kg |
| Dimensions | ± l: 164 mm w: 105 mm; h: 44 mm |
| External Connectors | USB port for power supply and data communication to and from PC. 2 screw terminals to connect to communication network BCU. 1 screw terminal to earth unit. |
| Water Resistance | Splash proof-IP54 |

BLASTWEB™ DUAL CHANNEL REPEATER

Filters, refreshes and repeats signal over twisted pair copper communication network between BCU's underground and Surface Blast Controller on surface.

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|----------------------------|---|
| Temperature Limits | -20 °C to +70 °C |
| Weight | ±21.3 kg |
| Dimensions | l: 400 mm; w: 210 mm; h: 400 mm |
| External Connectors | Mains Power Supply cable through WRE gland, 2 X Communication in and 2 X Communication out cable glands |
| Power Supply | 115 Vac, 230 Vac and 525 Vac |
| Battery | A sealed 12 V 7.2 Amp/hr zinc-acid battery provides 3–5 hrs back up during any power failures |
| Water Resistance | Splash proof-IP54 |

OPTIONAL ACCESSORIES-NOT SUPPLIED (ORDER SEPARATELY)**BLASTWEB™ 2-WIRE AND HIGH VOLTAGE (HV) TERMINATOR**

The 2-wire are to be used with NetShock™, DigiShot® Plus and DriftShot® electronic detonators. Provides continuous feedback on BCU connectivity and detonator panel status. The HV terminator is for electric detonator use only.

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| Temperature Limits | -20 °C to +70 °C |
| Weight | ±140 g |
| Dimensions | l: 124.2–125.8 mm; w: 54.5–55.5 mm; h: 40.05–41.05 mm |
| External Connectors | 2 terminals to connect to 2-wire electronic detonator harness |
| Water Resistance | Waterproof-IP67 |

- Harness Wire-0.71mm twisted pair copper wire with PVC or Polyethylene insulation available in 305 m spools. Connects to the terminators to the relevant detonator type being used
- SmartKeys (additional or replacement)-For safety purposes the system is activated through a pre-programmed personal identification of the blaster and a unique password (PIN). The system deploys two types of SmartKeys that are identified by a Yellow or Red colour. Insert the Yellow SmartKey (must be paired with matching red SmartKey) on the BCU after completion of connecting and testing of the blast installation (and the mine has been cleared of all personnel) to place the BCU in a waiting blast command state. Insert the Red SmartKey at the Surface Blast Controller (SBC), or at the BCU during a local blast to perform the arm and fire commands)