

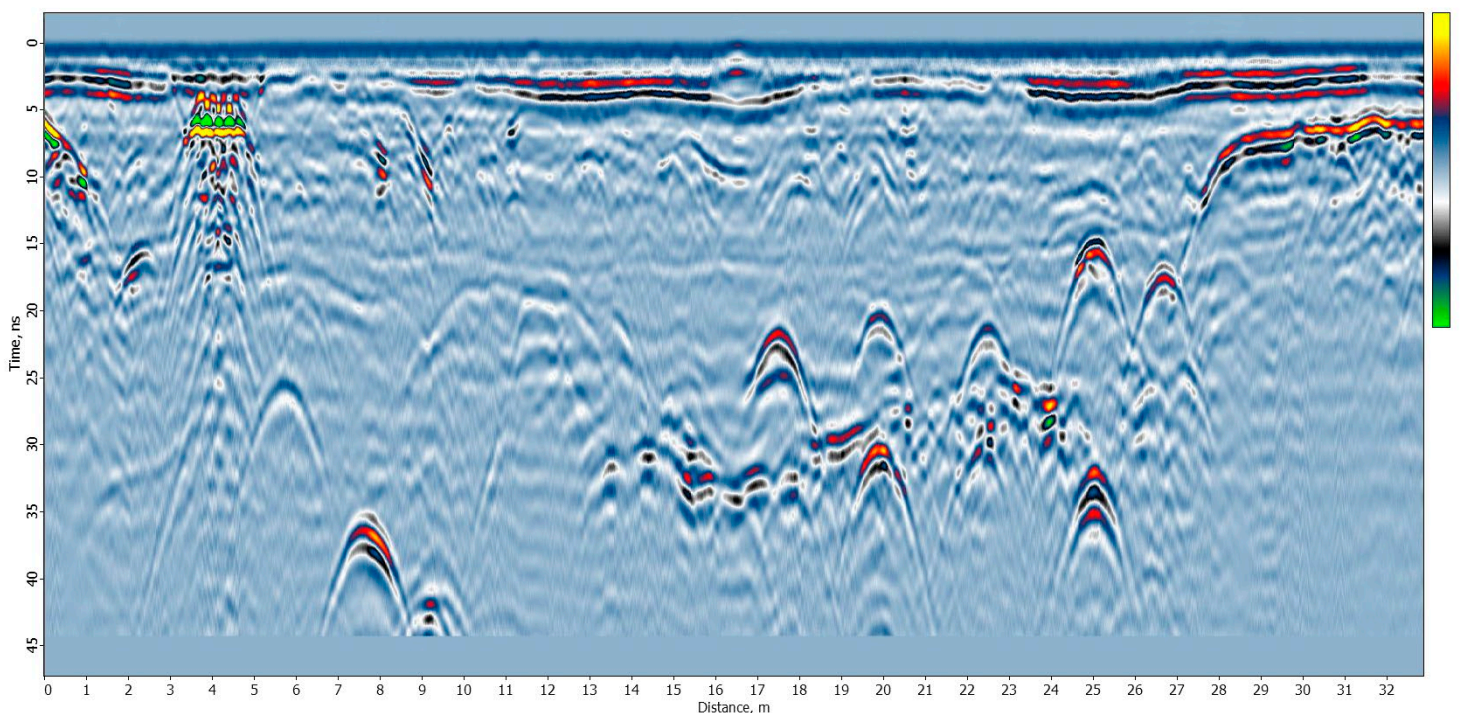


COBRA CBD WIRELESS GPR

Introducing the smart **CBD ANTENNA**
Triple frequency **200/400/800 MHz**
Outstanding **50-1400 MHz bandwidth**
Replaces **several** conventional antennas



UNPARALLELED QUALITY GPR DATA – WITHOUT BLIND SPOTS





WIRELESS OPERATION – No need for cables

PATENT PENDING CBD ANTENNAS

CBD ANTENNA TRANSMITS TRIPLE FREQUENCIES – 200, 400 and 800 MHz

ULTRA WIDE BAND PERFORMANCE –50 to 1400 MHz [1350 MHz bandwidth]

REPLACES SEVERAL CONVENTIONAL ANTENNAS

WITHOUT "DEAD ZONES" OR BLIND SPOTS

BLENDED FREQUENCY DATA – Optimal frequency automatically selected for all depths

UNIQUE RELATION FREQUENCY/VELOCITY –Proprietary formula

AIR COUPLED OPERATION – No need for ground coupling

COMPLETE GPR SYSTEM – 2 channel GPR, CBD-antennas, CU, Cart, Transport case

WIDE SELECTION OF CONTROL UNITS – Rugged PC with bundled software

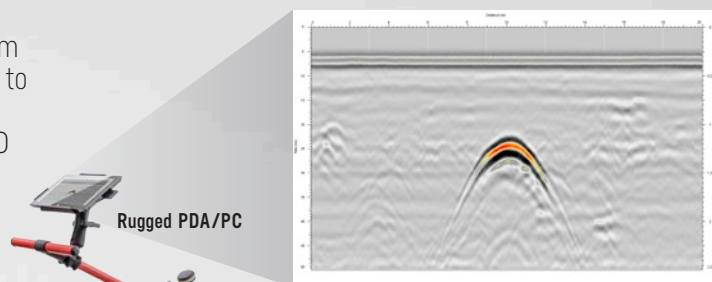
SMART CART – Quick release wheels for push and pull operation

COMPACT AND FLEXIBLE SYSTEM – Only 15 kg

OPTIONAL REAL TIME SAMPLING

THE SMART GPR

The **COBRA CBD WIRELESS GPR** collects data from hundred thousands of pulse reflections each second to help researchers identify objects below ground. It works in a multi frequency band from 50 to 1400 MHz, thus replacing several antennas with different frequencies used by other and older GPR systems.



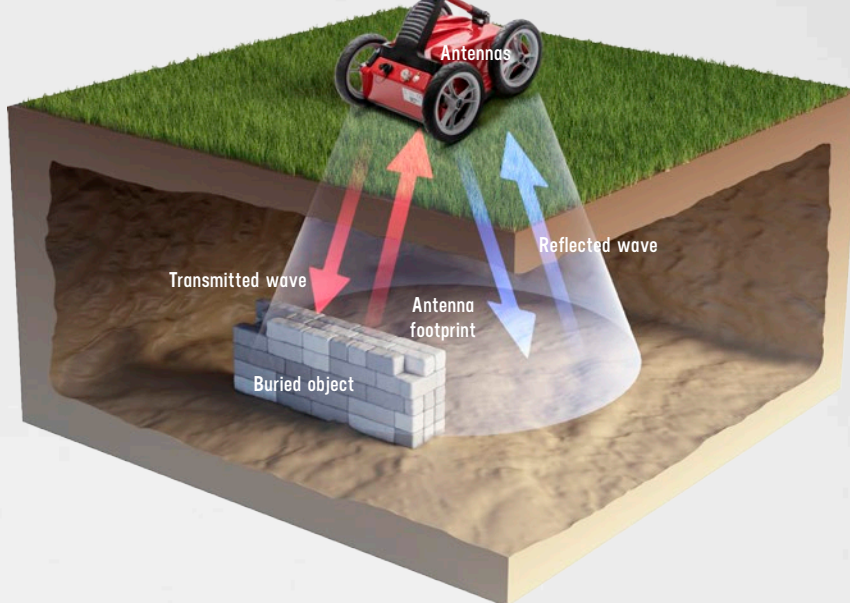
2D Radar profile, vertical view

HOW IT WORKS

The unique CBD antenna transmits pulses with triple frequencies in a blended pulse form.

The CBD antenna selects the optimal frequency needed for all layers and targets at different depths.

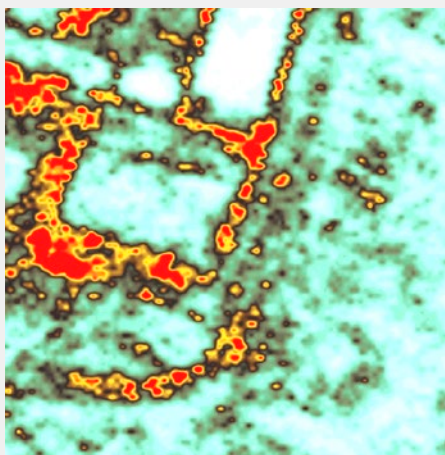
The CBD antenna data received can then be used for accurate velocity/RDP values for layers and targets via frequency analysis (using a proprietary formula - with linear relation between reflected frequency and velocity).



3-D RADAR DEPTH SLICE, HORIZONTAL VIEW

A 3-D software translates several 2-D radar profiles into a 3-D map, depth slice, at different depths. For full 3-D, the spacing between 2-D survey lines must be very close ($\lambda/4$).

The depth slice below shows a buried Roman building wall remains, at Carnuntum, Austria.



Buried remains of a building at 2 m depth shown as a 20 cm depth slice. Survey map: 40 square meters, based on 40 m long GPR-profiles separated by 50 cm



Photograph of buried wall remains after excavation

APPLICATIONS & USES

Just like X-Ray and ultrasound can image the inside of your body, the **COBRA CBD WIRELESS GPR** can be used to see the inside of different materials and structures in numerous applications.



INFRASTRUCTURE & UTILITY MAPPING

Inspect internal structures and identify voids.
Works with roads, airports, bridges, tunnels, railways dams and buildings.
Locate plastic-, concrete-, clay- or metal pipes
Map concrete before drilling, cutting or coring.
Detect obstacles in front of directional drilling operations. Find water leaks and illegal connections.



SNOW & ICE

Airborne mapping of snow- and ice thickness.
Find crevasses and avalanche victims.
Profile ice roads.



ENVIRONMENTAL

Locate hazardous waste,
UST-location.
Delineation of contaminant
plumes and product spills.
Map shallow lakes and rivers.





GEOLOGY & MINING

Locate gemstone pockets in pegmatite.
Find kimberlite, lateritic nickel.
Map internal structures and voids in soil.
Locate cracks in bedrock and building stones.

AGRICULTURE & FORESTRY

Locate agricultural and golf-green drainage tiles.
Determine soil water content and conductivity.
Map tree roots and rot in wood.

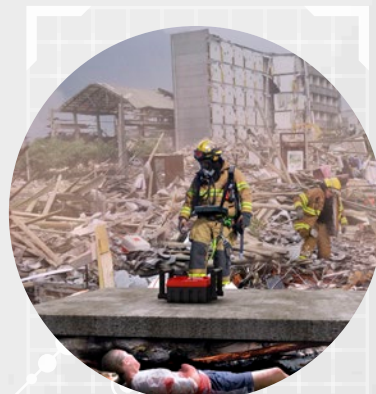


ARCHEOLOGY & FORENSICS

Pre-excavation mapping of buried structures, foundations, burial sites and chambers.
One of Radarteams most famous projects was when we located a 20.000 year old woolly mammoth, well preserved in the permafrost ground of Siberia.
The project was shown on Discovery Channel and can be found on Youtube with the search term "Raising the Mammoth pt. 2"

MILITARY & SECURITY

Locate tunnels, bunkers, hidden weapons and drugs.
Find land mines and unexploded ordnance (UXO).
Through wall imaging.
Rescue operations; locate trapped victims under collapsed buildings and landslides.



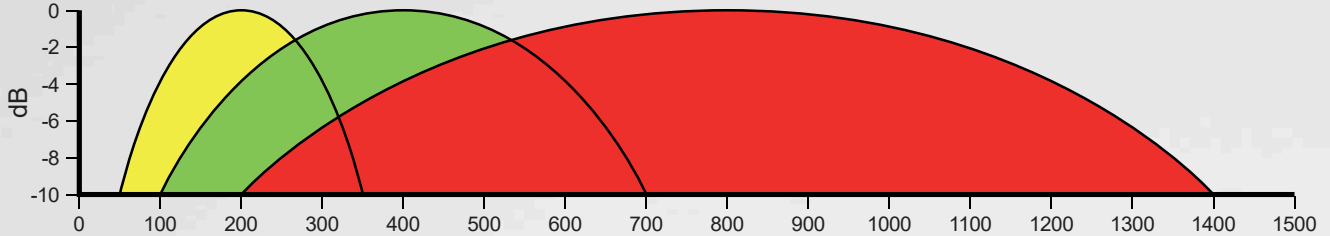
WHY MULTI FREQUENCY ANTENNAS?

The **COBRA CBD** Frequency Advantage

COBRA CBD GPR

uses a patent pending unique triple frequency antenna design (200, 400 and 800 MHz nominal frequencies). Because the CBD-antennas emits three ultra wide band pulses (150% of nominal frequencies compared to 100% for conventional antennas), that overlap and blend together it can replace multiple antennas with nominal frequencies between 200 and 800 MHz. (See frequency spectrum below)

Frequency Spectrum @ -10 dB for CBD-MF 200/400/800 Antennas



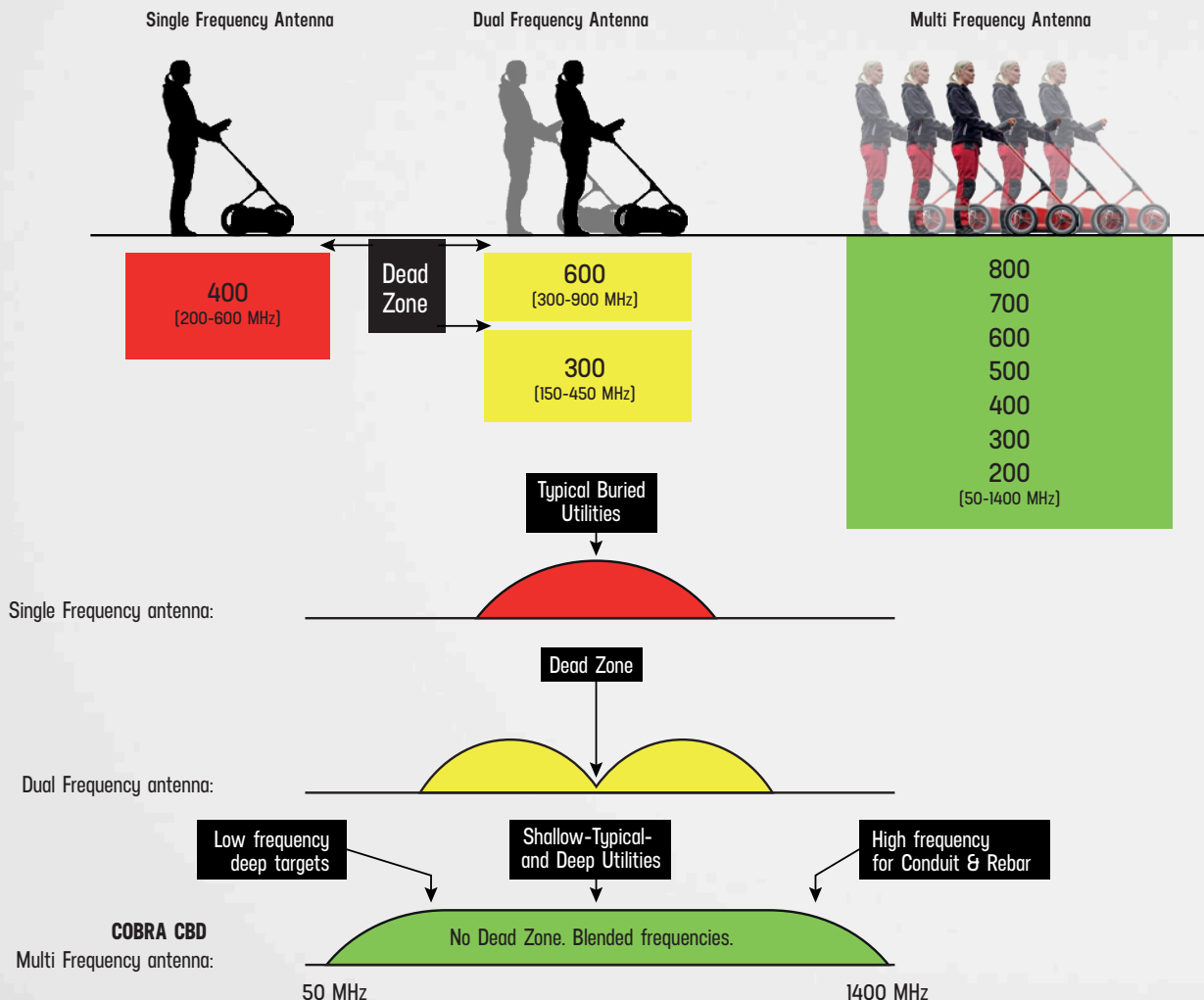
UNPARALLELED

With an unparalleled bandwidth of 1350 MHz the **CBD ANTENNA** has several advantages and features.

CUTTING EDGE

Cutting edge technology and state of the art in GPR gives the ultimate GPR-system

- Mixed/blended data with automatic optimum frequency selected through all depths in one single file.
- Near surface data with high resolution/frequency and deep targets with lower required frequencies.
- No need to set frequency filters. The smart CBD antenna filters by itself.
- No "dead zones" or blind spots in data due to blended frequencies.
- Calculate velocity directly from frequency content with proprietary formula.
- Real Time Sampling technology option
- Air coupled operation without ringing. (Other antennas must be ground coupled to avoid ringing)



HEAD TO HEAD COMPARING SAMPLE DATA

Conventional Dipole antenna versus
CBD FREQUENCY

A conventional single frequency antenna to the left compared with the
CBD MULTI FREQUENCY ANTENNA on the right.

The test was made the same day, on the same site, with both antennas aircoupled 3 cm above ground. Samples show the Raw data.

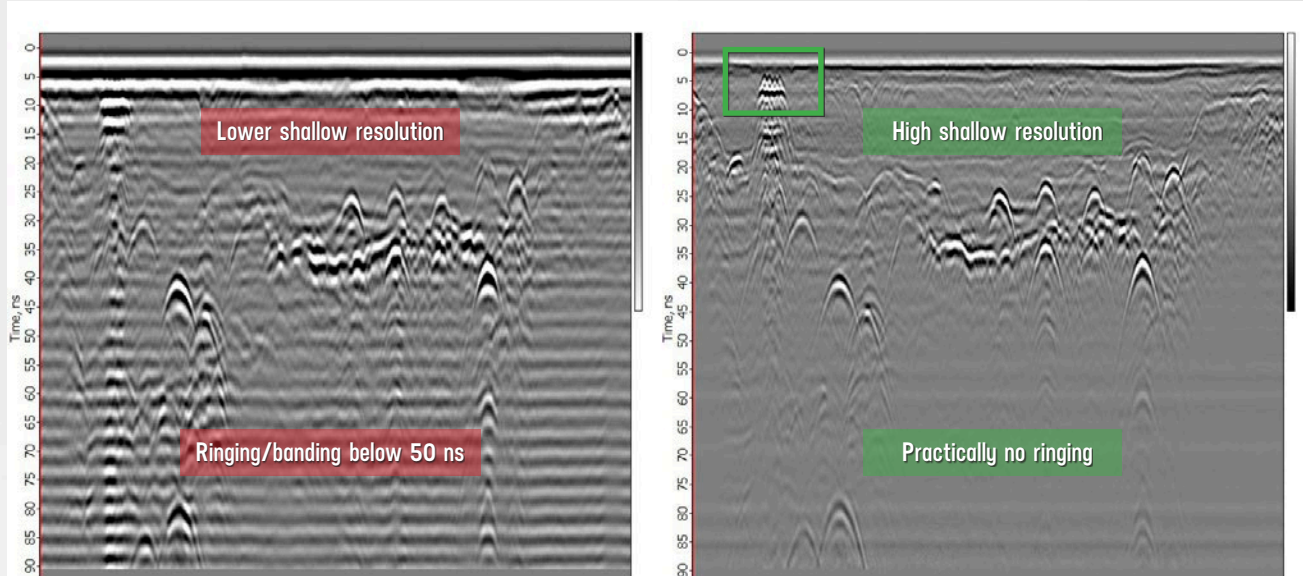
It is obvious that our CBD data is superior compared with a conventional single frequency antenna. The ringing that is seen in conventional dipoles, even at this minor aircoupling, can not be found in the CBD data. A tripled bandwidth gives improved data quality with better resolution, target detection and penetration.

CONVENTIONAL DIPOLE ANTENNA [RAW DATA]

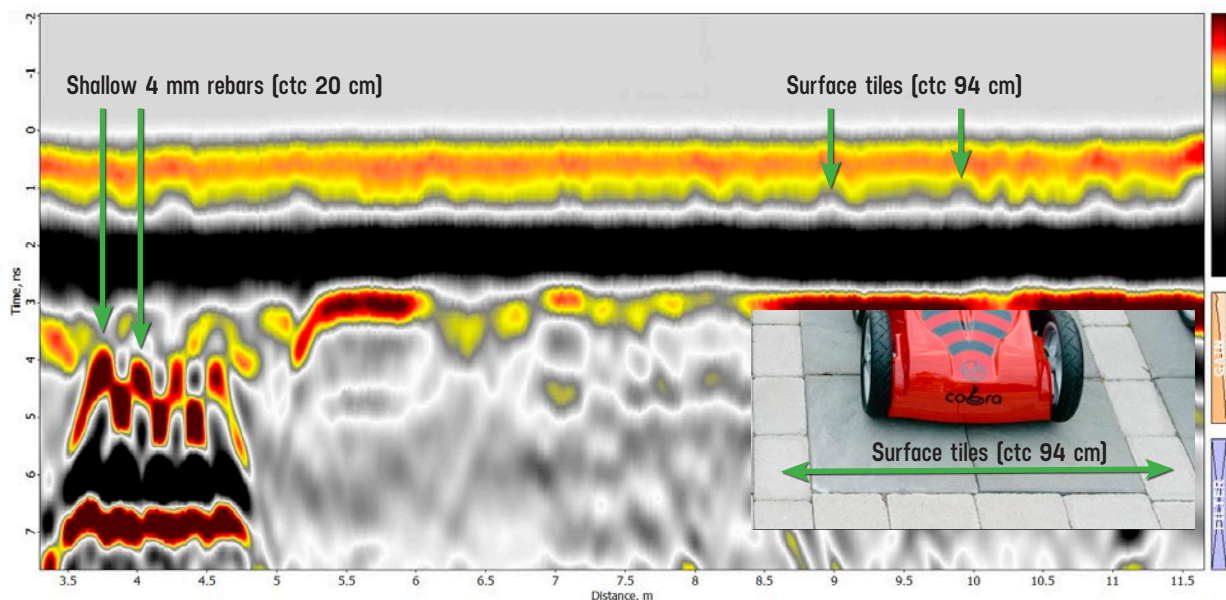
- Limited Bandwidth
- Low resolution
- Ringing/banding when air launched

CBD MULTI FREQUENCY ANTENNA [RAW DATA]

- Tripled Bandwidth
- High resolution
- No ringing/banding when air launched



INFORMATION ALREADY IN DIRECT PULSE [RAW DATA,SURFACE DETAIL]



DETAILS

Detail from the CBD Multi Frequency antenna sample, clearly shows the high resolution capacity of our CBD Multi antenna (see green outlined box in top right image). Raw data as collected with the antenna aircoupled, 3 cm above ground. In the above magnified, colour scaled sample, the spacing between surface tiles (see photo), are seen already in the direct pulse. Each individual shallow 4 mm rebar is also easy detectable.

COBRA CBD WIRELESS GPR – TECHNICAL SPECIFICATIONS

ANTENNA / GPR 2 channel Ground Penetrating Radar system with shielded antennas

Antenna type CBD* Multi Frequency Antenna [* Patent pending]
Nominal frequencies 200/400/800 MHz
Operating bandwidth 50-1400 MHz
Applied voltage 200 V
Sample rate 100,000 samples/second
Scan rate 1-100 scans/s per channel @ 512 samples/scan
Sample output 16 bit digital raw data

CONTROL UNIT / CU Selectable PC/PDA, Rugged, MIL-STD-81F/G, water- and dust resistant, IP-65 or IP-67 with bundled data acquisition. DAQ-software for control, display, processing and storage of GPR-data.

Data format Standard Geophysical SEG Y Data Format [.sgy]
Data channels 1 or 2 with individual settings for depth, filter and gain
Vertical filters Off, Digital
Horizontal filters Stacking, Background removal
Gain points 1- 10 Linear gain
Gain levels 0 to +60 dB
Data storage Raw data storage with memory for Gain used
Data file size Limited only by available HDD-space

SURVEY CART Push and Pull non-metallic handle and support, tactical RAM-mount, cradle for recommended and purchased rugged PDA/PC. 12" quick release non-inflatable wheels. High resolution SW-encoder.

ENVIRONMENTAL

Temperature -20°C to 40°C internal temperature
Humidity 96% non-condensing
Ingress protection IP68 connectors

MECHANICAL

Size [L x W x H] 60 x 52 x 29 cm
Weight 15 kg

OPERATING

Operating platforms Airborne operation, high speed air-coupled operation, ground-coupled operation
Battery Integrated 73 Wh Li-Ion
Operating time 8 hours
Operating mode Manual [1-100 scans/s], Distance [SW-encoder] with or without GPS
GPS positions GPS positions integrated with GPR-data for every scan in both time- and distance mode
Operating depth 0-2000 ns selectable. Typical 0-500 ns. Depth range 0 - 10 m depending on ground properties.

ACCESSORIES

Hardware Helicopter survey kit, Road/Railway kit, Transport case, High accuracy GPS, Harness
Software GPR Data Acquisition software included [COBRA DAQ] for Cobra Wireless GPR and Cobra Plug-In GPR. PRISM Post processing software with 3d export module [Voxler, Reflex 3d, GPRSlice].