UXO DETECTORS

MAGNETOMETER DETECTORS

BGIF CCT-2 MAGNETIC DETECTOR

Beijing Geological Instrument Factory | China

GENERAL DESCRIPTION

The CCT-2 Magnetic Detector is a highly sensitive differential magnetometer used for the detection of bombs, shells, anti-tank mines and underground pipeline with ferrous content buried in earth or water, working on a fluxgate principle.

A 192 x 64 dots liquid crystal display (LCD) on the front panel of the CCT-2 displays the set parameters in operation. The real-time detecting result appears either in the form of digits or in the form of curves. Simultaneously, the detector saves the result in a storage system with the capacity of 8,000 detecting points. When the operation in the whole detecting area is complete, the results can be transferred to a computer and output as a result chart with a special software. The pinpoint of the object can be easily decided by analysing the chart.

Detection can be performed in two ways: stationary operation and continuous operation. The former is adopted to circle the range of the object while the latter is used to pinpoint the object.

The detector has a keyboard on the panel to set various parameters of the unit and to control the operation.

Operation is simple, with only a short training period required before operation. When detection is performed over large areas, several detectors can be used at the same time without any interference.

The main components of the CCT-2 are the working unit, the sensor, the charger, a set of adjusting tools, the carrying belt, an aluminium shipping and storage case, and the operation and maintenance manual.

The CCT-2 Magnetic Detector in service

WORKING METHODOLOGY

The CCT-2 works on the principle of measuring the distortion of the earth's magnetic field. Two magnetic sensors are vertically mounted in a tube 50 cm apart to measure the magnetic field. When no ferromagnetic target exists between the sensors, both values are subtracted and result in zero. When a ferromagnetic target is disturbing the homogenous field the result is two different values so that the difference is not zero. Depending on the signal amplitude and polarity, the alarm signal is computed.

POWER SUPPLY

The CCT-2 works with a 4.4 Ah rechargeable lithium battery fixed inside, which ensures the unit to work for eight hours continuously. A special charger for all kinds of power supply mode is offered as an accessory.

DETECTORS IN USE TO DATE

No detailed information was provided by the manufacturer. The manufacture states there has been a heavy demand from past and new clients since the release of the tool to the market.

FACTORY SUPPORT

- BGIF has manufactured precision instruments for use in detection and in laboratories for more than 40 years. It has good research and production capacities.
- The manufacturer assures supply period and product quality.
- Spare parts can be delivered to the customer.
- Operation and maintenance training can be offered at BGIF facilities or at a customer's location at their expense.
- The user's manual (including instructions on operation and maintenance) is available in English, and other languages on request.
- The manufacturer provides a warranty of 24 months.

MAINTENANCE SUPPORT

- There are no special requirements for technicians or workshop facilities.
- A special tool is offered with the unit. Others needed are standard ones available in the market.
- The user's manual has detailed explanations for operation and maintenance.

TEST AND EVALUATION

The manufacturer provides several available test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

The CCT-2 detects ferrous targets only. No additional information is available.

TECHNICAL SPECIFICATIONS — CCT-2

DETECTOR

1. Brand	BGIF
2. Model	CCT-2
3. Version	01 | 2005
4. Used detection technology	Difference magnetometer working on fluxgate principle

DIMENSIONAL DATA

5. Working length	
> min. length	—
> max. length	1,100 mm (search pole)
6. Search head	
> Size	Ø 40 x 750 mm
> Weight	2.23 kg
> Shape	Tube
7. Transport case	
> Weight	6.2 kg
> With equipment (full)	12.5 kg
> Dimensions	820 x 380 x 170 mm
> Hard | Soft case (material)	Hard case | aluminum
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution | Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status	In production
14. Detectors | Systems in use to date	Not given
15. Other types	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	MIL STD
18. Temperature (limitations)	
> Storage	- 50° C to + 70° C
> Operational	- 20° C to + 50° C
19. Water resistant	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Manual, cannot be used in magnetic soil
22. Operational hours | Operating endurance	Over 8 h

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual or automatic
> Duration	Continual or point
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity switch
> Low-metal-content mines	Depending on their size, material and the local interference
> Anti-vehicle mines	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Visual by real-time display on LCD screen
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0.2-1 m/s
31. Search coil | Antenna	Tube
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply | Source	4.4 Ah rechargeable Lithium battery pack (over 2y)
35. Operating time	Over 8 hours
36. Power supply	
> weight	—
> no. of batteries | size | type	4.4 Ah rechargeable Lithium battery pack
> rechargeable	rechargeable (BGIF charger applying to all power supply mode)
> other	—

COSTS

37. Price	
> for one detector	Not given
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request
> spare parts	Upon request
> software	Upon request
> extended warranty	Upon request
39. Total	—
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	—
43. Additional technical data | information	—
44. Compliant standards	ISO-9001

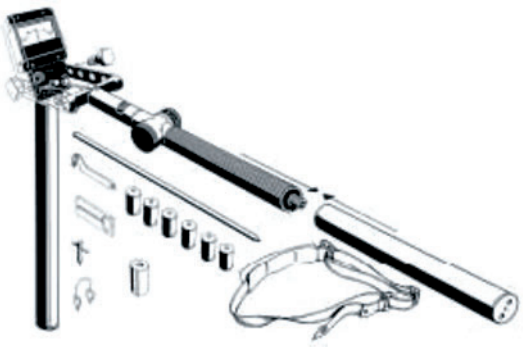
EBINGER MAGNEX 120 LW

Ebinger | Germany

GENERAL DESCRIPTION

The *MAGNEX 120 LW metal detector* has been developed particularly for the detection of ferromagnetic ammunition in the ground or in shallow water. The locator is designed for borehole use to indicate deeply buried UXO/ERW, or for operation in areas with substantial interference from surface fragments.

The pinpoint location with audio signal and the digital multi-channel system ensure a high level of reliability and user friendliness.



Schematic diagram of Ebinger MAGNEX 120 LW

WORKING METHODOLOGY

The MAGNEX 120 LW works on the gradiometer principle, which detects geomagnetic field interference. Objects made from ferromagnetic material can show a magnetic field which superimposes on the natural terrestrial field. Amplitude and polarity of the local anomaly are used to indicate the position of the ERW.

Digital measurement data logging

To ease data collection and storage the MAGNEX locators and the MAGNETO system suit each other well and substantially increase productivity in bomb disposal. A high degree of field input makes the system very user friendly. Its functionality facilitates its use when investigating the extent of pollution or when processing detection data from ammunition. In conjunction with the DLM datalogger, the system can be used as a man-portable single-channel or triple-channel system.

The detector is equipped with a new Ebinger-developed inductor system which ensures a base clearance of 430 mm.

Ease of operation and a rigid mechanical design facilitate reliable operation for professional clearing tasks. The stepping switch offers the following sensitivity ranges:

- Level 1: 3,000 nT/m;
- Level 2: 1,000 nT/m;
- Level 3: 300 nT/m;
- Level 4: 100 nT/m;
- Level 5: 30 nT/m;
- Level 6: 10 nT/m.

No further information is given by the manufacturer.

DETECTORS IN USE TO DATE

Since 1993, more than 1,200 units of MAGNEX 120 have been purchased. The detector is in service with various NGOs and commercial companies worldwide.

POWER SUPPLY

- The MAGNEX 120 LW is powered by 6 x 1.5V round cell LR20 batteries.
- Operational life of battery is approximately 40 hours.

FACTORY SUPPORT

- All detectors are covered by a 24-month warranty. A worldwide service network ensures permanent availability of spare parts.
- Operation and maintenance training is provided at Ebinger facilities or on site.
- Additional factory support by specially trained staff is provided on request.
- Instruction and maintenance manuals are available in Arabic, English, French, German, Italian and Russian; other languages available on request.

MAINTENANCE SUPPORT

- There are no special requirements for technicians or workshop facilities. Most repairs can be carried out by Ebinger-trained staff on site.
- Step-by-step explanations in the manuals ensure easy maintenance of the system.

TEST AND EVALUATION

The detector went through comprehensive internal tests: reports can be provided by the manufacturer on request.

REPORTED LIMITATIONS AND STRENGTHS

No information available at this time.

DETECTOR

1. Brand	EBINGER
2. Model	MAGNEX® 120 LW MAGNETOMETER
3. Version	05 | 2001
4. Used detection technology	Difference magnometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	
> Length	1,280 mm (complete)
> Probe	600 mm
6. Search head	
> Size	600 x 43 mm
> Weight	1.5 kg
> Shape	Circular probe
7. Transport case	
> Weight	3 kg
> With equipment (full)	4.2 kg | 1 kg
> Dimensions	800 x 280 x 180 mm
> Hard | Soft case (material)	Hard plastic | canvas satchel
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	4.2 kg
10. Weight, additional equipment	—
11. Weight distribution | Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	More than 1,200
15. Other types | Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	0 - 95 %
18. Temperature (limitations)	
> Storage	-53° C to +70° C
> Operational	-30° C to +55° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Auto | manual
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	Up to 75 h, depends on type of battery
> medium temperature (around 20° C)	Up to 75 h, depends on type of battery
> high temperature (higher than 30° C)	Up to 75 h, depends on type of battery

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual | automatic
> Duration	Continual
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity adjustment manual | auto
> Low-metal-content mines	—
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Optical, sound and data output
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	0.2-1.5 m/s
31. Search coil | Antenna	Probe 600 mm
32. Limitations	Only ferromagnetic material
33. Interference (with other detectors)	< Safety distance

POWER

34. Power supply | Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	—
> no. of batteries | size | type	6 x 1.5V dry batteries LR-20
> rechargeable	7 x 1.2V rechargeable batteries
> other	—

COSTS

37. Price	
> for one detector on request	US$ 4,000-US$ 5,000
> reduction for higher quantity	Yes
38. System price	
> with training	On request
> spare parts	On request
> extended warranty	On request
39. Total	—
40. Possibility to rent/lease	On request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Borehole cable
43. Additional technical data | information	—
44. Compliant standards	EMC tests according to MIL-STD 461 D, DIN EN ISO 9001:2000

FOERSTER FEREX 4.032

Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

The *FEREX 4.032 metal detector* uses the fluxgate magnetometer principle to detect magnetic anomalies caused by ferromagnetic objects. Its primary use is to search for ERW buried deep in the ground. Under certain circumstances (for example, anti-vehicle mines covered by desert sand), the FEREX can successfully be used for mine detection.

The detector replaces the FEREX 4.021, which was introduced in the mid-1990s. Due to the tension band technology inside the Foerster magnetometer, the system is one of the most sensitive fluxgate magnetometers available. These probes are lifetime calibrated – even if used within a rough environment or within an extreme climate. The standard hand-held version "FEREX 4.032 API" indicates ferromagnetic objects by a pointer instrument and sound.

As it is a modular system, a simple exchange of the control box upgrades the unit to a FEREX 4.032 DLG (data logger). This detector combines the API features with an integrated four-channel data logger for scanning fields in order to evaluate the resulting map of magnetic anomalies on a standard PC.

The FEREX 4.032 DLG (datalogger) in the Egyptian test site

The FEREX 4.032 DLG (datalogger) multi-sensor detection with GPS

The FEREX 4.032 DLG (datalogger) GPS

The FEREX Dataline software calculates, among other data, the exact position, depth or orientation of the scanned objects (see further description below).

The system is capable of fulfilling tasks such as underwater or borehole search. The high-end solution within this instrument family is a vehicle-based multichannel system (Foerster Multicat), supported by a differential global positioning system (GPS). In 2002, following customer feedback, the FEREX 4.032 was modified to minimise its length. Some smaller mechanical modifications have been undertaken to optimise handling. At the same time, the Dataline software was equipped with a bundle of optional features. New types of multi-probe-holder have been introduced.

Foerster supplies FEREX in three versions: the API (with a classic pointer instrument) and the two data logger versions, DLG STD and DLG GPS Cartograph. The DLG GPS Cartograph is designed for connection to all conventional GPS with RTK (Real Time Kinematic) operational mode and laser positioning systems (Tachymeter Total Station).

WORKING METHODOLOGY

By detecting variations within the earth's magnetic field, the FEREX indicates plus and minus poles of ferromagnetic objects. Geometry and strength of the detected poles enable the user to determine the location, depth and size of the object. In general, problematic soil types do not influence the results gained from this working principle.

POWER SUPPLY

- As standard, the FEREX 4.032 is powered by four 1.5V D-cells.
- Rechargeable batteries are available on the open market.
- Sensitivity and detection quality are never influenced by battery condition.
- Operating time with one set of alkaline batteries reaches 60 hours (in intermittent operation) or 36 hours (data logger).

DETECTORS IN USE TO DATE

The FEREX 4.032 has been in service since 2000 and has been used in Afghanistan, Australia, Austria, Bulgaria, Canada, Croatia, Denmark, Egypt, finland, France, Germany, Indonesia, Iran, Ireland, Italy, Japan, the Netherlands, Portugal, Poland, Russia, Spain, Tunisia, UK, Uruguay, the US and Viet Nam.

Institut Dr. Foerster | Germany

FACTORY SUPPORT

- Spare parts are available exclusively from Foerster which has a network of representatives in more than 40 countries. Most offer complete after-sales service.
- Besides offering training on the customer's site, Foerster provides modern test and training facilities in Reutlingen, Germany. A full training programme for trainers, including lessons on background knowledge and using a variety of training materials, is available in English and German. On request, training forms part of a purchasing package.
- Standard manuals and service documentation are available in English, French, German, Russian and Spanish. Other languages available on request.

The FEREX 4.032 DLG (datalogger) multi-sensor detection with wheel set.

MAINTENANCE AND SUPPORT

- The FEREX maintenance system is on two levels: basic field maintenance and workshop maintenance.
- The recommended number of workshops depends on the logistical set-up. The personnel for handling a workshop must have basic knowledge of mechanical and electronic repairs.
- Foerster offers supply of complete tool sets and testing equipment as well as service training. Fully equipped workshops with trained personnel can handle all repairs down to factory final assembly level.

TEST AND EVALUATION

Foerster performs tests within its own facilities mainly for research and quality control. The manufacturer states that tests are largely carried out under "real" conditions.

One test report is available at the ITEP website as follows:

1. A. M. El-Nadi, *Experimental Cairo Testing and Evaluation of Mine and UXO Detectors*, by Faculty of Engineering, Cairo University, Giza, Egypt, published 2007.

REPORTED LIMITATIONS AND STRENGTHS

No information is available at this time.

DETECTOR

1. Brand	FOERSTER
2. Model	FEREX 4.032
3. Version	API, DLG, DLG Kartograph
4. Used detection technology	Metal detector working by fluxgate magnetometers

DIMENSIONAL DATA

5. Working length	Approx. 1.4 m
6. Search sensor	
> Size	Length 853 - 1,435 mm | Ø 35 mm
> Weight	0.55 - 1 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 4 kg
> With equipment (full)	Approx. 9 kg
> Dimensions	1,000 x 280 x 340 mm
> Hard | Soft case (material)	Hardcase | plastics
8. Weight, hand-held unit	Approx. 4 kg
9. Weight, carrying (operational detection set)	Approx. 4 kg
10. Weight, additional equipment	Headphones 0.1 kg; Carrying belt 0.16 kg
11. Weight distribution | Balance	Balanced around the handgrip
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	—
15. Other types | Models	—
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	No limitations
18. Temperature (limitations)	
> Storage	-57° C to +70° C
> Operational	-35° C to +70° C
19. Water resistant (Yes / No)	Sensor is 100 m sea-waterproof. Electronics unit is highly splash-proof. See MIL-STD specs.
20. Shock | Vibration resistant	See MIL-STD specs.
21. Environmental Compensation	6 operation modes for suppression of electromagnetic influences and filter for big/small objects.
22. Operational hours | Operating endurance	
> medium temperature (around 20° C)	Depending on working rhythm and instrument type: approx. 35-80 h with alkaline batteries.

DETECTION OPERATION

23. Calibration | Set-up	—
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Low-metal-content (type of mine)	No
> Anti-vehicle mines (type of mine)	Full metal case (ferromagnetic) see figure on bottom
> ERW	Hand grenade; 500 lbs bomb (Mk 82);
25. Output indicator	Audio by inbuilt speaker or headphones, visible by pointer instrument and on screen via evaluation software Dataline
26. Pinpointing feature	—
27. Adjustment of search head angle	Manual
28. Soil influence	—
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	—
31. Search coil | Antenna	—
32. Limitations	—
33. Interference (with other detectors)	No

POWER

34. Power supply | Source	Battery
35. Operating time	35 | 80 h with alkaline batteries
36. Power supply	
> weight	Not applicable since forming part of the unit
> no. of batteries | size | type	4 x 1.5V mono-cell IECLR (ANSI standard size D)
> rechargeable	Possible
> other	No applicable

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Depending on quantity
> spare parts	Depending on quantity
> extended warranty	Available on request
39. Total	T.B.D.
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Headphones, workshop equipment and tools, GPS, multiprobe-holders (hand-held and vehicle-based), underwater cables, borehole equipment
43. Additional technical data | information	Service manuals, training programme
44. Compliant standards	**Military standards** MIL-STD 810E 514.4-1 Vibration MIL-STD 810E 516.4 Mechanical shock, Procedure I MIL-STD 810E 516.4 Drop test, Procedure IV MIL-STD 810E 501.3 High temperatures MIL-STD 810E 502.3 Low temperatures MIL-STD 810E 506.3-1 Rain MIL-STD 810E 503.3 Temperature shock (transport) MIL-STD 810E 512.2 Leak test MIL-STD 810E 505.3 Solar radiation (sunshine), Procedure I MIL-STD 461DRE 102 5.3.13.1 Radiation MIL-STD 461DRS 103 Irradiation EMC according to MIL-STD 461D

FEREX DATALINE 4.800

Institut Dr. Foerster | Germany

GENERAL DESCRIPTION

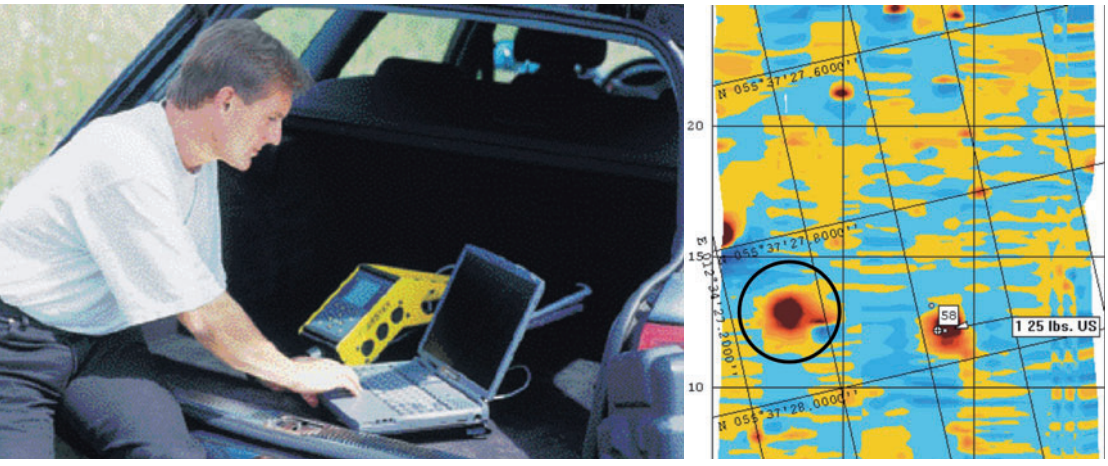
The *FEREX DATALINE 4.800 software package* is available in both STD (standard) and GPS versions as well as in the corresponding filter versions. With this software Foerster offers an evaluation programme for magnetic field data (geomagnetic data) which are acquired in a plane by a metal detector using the fluxgate magnetometer principle to detect magnetic anomalies caused by ferromagnetic objects. Primary detected objects are ERW buried deep in the ground. Under certain circumstances (for example, anti-vehicle mines covered by desert sand), the FEREX data logger can be successfully used for mine detection.

Acquired data can be conveniently and quickly transferred to a PC or laptop and analyzed, evaluated and displayed with FEREX DATALINE. The software calculates, among other data, the exact position, depth or orientation of the scanned objects.

If the FEREX data logger was supported during data acquisition by a DGPS (Differential Global Positioning System) with RTK (Real Time Kinematik) as high-end solution GPS, coordinates are stored with the magnetic field data. FEREX DATALINE than overlays the GPS coordinates grid to the coloured map. GPS data are also assigned to calculated objects in the object map.

The FEREX DATALINE BM 4.800 is capable of fulfilling tasks such as evaluation of acquired data by borehole search.

Foerster supplies FEREX DATALINE in five versions: the DATALINE STD (standard version), DATALINE STD-F (standard filter version), DATALINE GPS, DATALINE GPS-F (filter version) and DATALINE BM (borehole version).



Data transfer from the FEREX data logger to a Laptop for evaluation with DATALINE
An identified dipole is marked by a black circle: the grid of GPS coordinates is overlaid and a second object is named by a number and a comment

WORKING METHODOLOGY

By detecting variations within the earth's magnetic field, the DATALINE converts the field file and indicates plus and minus poles ("magnetic dipoles" with positive and negative extreme values) of ferromagnetic objects as a colour-coded map. Geometry and strength of the detected poles enable the user to determine the location, depth and size of the object. In general, problematic soil types do not influence the results gained from this working principle.

The colour-coded map is the base for all further object evaluations. The user selects dipoles which are forming pairs of each object.

PC/LAPTOP REQUIREMENTS

The DATALINE 4.800 software can run with the following minimum system requirements on a PC, laptop or notebook:

- Pentium processor, minimum Pentium 4
- 512 MB RAM
- VGA graphics card or better, 256 colours whereever possible
- 1 free serial port RS 232
- 1 usable USB port for the dongle.

EVALUATION SOFTWARE FOR DETECTORS IN USE

The DATALINE 4.800 has been in service since 1997 and has been used worldwide.

FACTORY SUPPORT

- Foerster has a network of representatives in more than 40 countries. They are qualified for software support. Most offer complete after-sales service.
- Besides offering training at customer's sites, Foerster provides modern test and training facilities in Reutlingen, Germany. A full training programme for trainers is available in English and German. On request, training forms part of a purchasing package.
- Software and standard manuals and service documentation are available in English, French, German, Polish and Russian. Other languages available on request.

MAINTENANCE AND SUPPORT

- The recommended number of training workshops depends on the knowledge and experience of the customer's personnel. The personnel for handling a workshop must have user and field administration knowledge. Operating personnel requirements:
  - Knowledge of Windows
  - Ability to identify and setup hardware ports on the PC
  - Experience of installing programmes.

TEST AND EVALUATION

Foerster performs tests within its own facilities mainly for research and quality control. The manufacturer states that tests are largely carried out under "real" conditions.

REPORTED LIMITATIONS AND STRENGTHS

One of the reliable strengths is the user administration function which permits the assignment of the evaluated field to the responsible programme operator. Responsibilities can thus be traced and documented at all times.

By using the introduced colour coding for open fields it is immediately possible to identify whether one is dealing with a field with raw data or if the field data was actually recorded with a "non-Foerster system".

EVALUATION UNIT

1. Brand	FOERSTER
2. Model	FEREX DATALINE 4.800
3. Versions	STD, STD-F, GPS, GPS-F, BM
4. Used evaluation technology	The use of the FEREX DATALINE evaluation software is subject to a license contract, which grants you the opportunity to use the program as it was intended and as described in the instruction manual. This software calculates ferromagnetic objects using magnetic data taken in a plane and applies mathematical, iterative computation methods which refer to the magnetic moment of a spherical body. However as the detected objects generally involve geometries that deviate from the sphere, the calculations are best possible approximations of the real-life situation. Therefore we do not accept any liability for any attempt on the part of the program user to derive a hidden objects standardization on the basis of the evaluation results.

DIMENSIONAL DATA

5. Working length	—
6. Search sensor	Magnetic field data acquired by a FEREX data logger working with fluxgate magnetometers
7. Transport case	Software CD with USB dongle in transparent case
> Weight	Approx. 0.1 kg
> With equipment (full)	—
> Dimensions	135 x 190 x 15 mm
> Hard | Soft case (material)	Plastics
8. Weight, hand-held unit	—
9. Weight, carrying (operational detection set)	—
10. Weight, additional equipment	—
11. Weight distribution | Balance	—
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status	In production
14. Detectors | Systems in use to date	Worldwide (countries see FEREX 4.032 data logger)
15. Other types | Models	—
16. Location of use	—

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	Notes for handling and storage of data CDs
18. Temperature (limitations)	Notes for handling and storage of data CDs
19. Water resistant (Yes / No)	Notes for handling and storage of data CDs
20. Shock | Vibration resistant	Notes for handling and storage of data CDs
21. Environmental Compensation	—
22. Operational hours | Operating endurance	—

DETECTION OPERATION

23. Calibration | Set-up	—
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Low-metal-content (type of mine)	—
> Anti-vehicle mines (type of mine)	—
25. Output indicator	On screen of the PC/Laptop
26. Pinpointing feature	Calculated object co-ordinates
27. Adjustment of search head angle	—
28. Soil influence	—
29. Best use in	
> Sand	—
> Peat	—
> Clay	—
> Ferruginous soil (laterite)	—
30. Optimal sweep speed	—
31. Search coil | Antenna	—
32. Limitations	—
33. Interference (with other detectors)	—

POWER

34. Power supply | Source	—
35. Operating time	—
36. Power supply	
> weight	—
> no. of batteries | size | type	—
> rechargeable	—
> other	—

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Depending on quantity
> spare parts	—
> extended warranty	Available on request
39. Total	T.B.D.
40. Possibility to rent/lease	Available

OTHERS

41. Duration of warranty	12 months
42. Additional equipment	—
43. Additional technical data | information	Operational manuals, training programme
44. Compliant standards	—

PERFORMANCE FEATURES (OVER ALL VERSIONS)

45. Diverse options for calculation of the:
    - > object coordinates,
    - > position, depth and size of presumed ferromagnetic objects specifying a quality number

46. Reading out of individual or several fields from the data logger in a procedure with individual or incremental designation

GEOMETRICS G-858

Geometrics | U.S.A.

GENERAL DESCRIPTION

Geometrics designs and manufactures high-sensitivity total field magnetometers for locating ferrous objects underground. The primary tool for this application is the G-858 Cesium Vapor MagMapper system. The *Geometrics G-858* is a portable caesium vapour magnetometer system for demining and ERW detection. The main components are the sensor, belt-mounted display/logging console and a hand-held counterbalanced staff.

The G-858 can be configured with one or two sensors, allowing for gradient measurements as well as logging of GPS for positioning. The system samples at 10 times per second at noise levels of about 0.05nT thus providing extremely rapid survey of large areas of land, up to 2 acres (1 hectare) per hour. "A basic software package MagMap™ is supplied as an integral part of the G-858 system and provides:

- Transfer of the raw magnetometer, base station and other survey data to the client PC;
- Standard corrections for position errors, transients, and time varying errors (diurnal);
- Repositioning, linear interpolation and format of corrected data into X,Y, Z ASCII columnar values for use with Surfer for Windows, Geosoft or other client-supplied contouring programs. Surfer for Windows by Golden Software can be employed to grid the data and to generate 2D and 3D color contour maps with full text annotations."[1]

Cart with 3 sensors mounted

[1] Geometrics, Portable Cesium Magnetometer/Gradiometer Model G-858, A Professional Magnetic Mapping System, http://www.expins. com/images/products/106020.pdf#search=%22Professional%20Magnetic%20Mapping%20System%22, p.3.

WORKING METHODOLOGY

The basic operating principle of the optically pumped cesium vapour magnetometer is described at the website http://en.wikipedia.org/wiki/Magnetometer. Basically it is an atomic clock which oscillates at a frequency dependent on the ambient magnetic field. It is a passive device, measuring distortion in the earth's magnetic field, thus allowing much greater range than that typically associated with metal detectors. The rule of thumb is that 250 lb (110 kg) of iron or steel can be detected at 50 ft (15 m); 30 lb (13 kg) at 25 ft (7 m); and 4 lbs (2 kg) at 9 ft (3 m). Output is visual and audio. The most powerful feature is its mapping ability, which can detect small ferrous objects or deeper objects not detectable with metal detectors or in search mode. This is especially useful in initial reconnaissance and certifying site clearance. The magnetometer only senses ferrous material (containing iron or steel) and thus soil conditions, types, presence of water, etc., do not impact performance. However, the magnetometer cannot detect the presence of gold, aluminium, brass or plastic. It is sensitive to excavation where normal soil magnetisation has been disturbed.

The Geometrics G-858 console

Three consoles complete

DETECTORS IN USE

There are more than 500 G-858 systems operational worldwide and the system has been in service for 10 years. The G-858 can be used for ERW detection, mining/oil/gas survey, environmental assessment, utility location, forensics and archaeology. Geometrics has supplied this equipment to Naval Research Labs, the Army Corps of Engineers, UXB, Parsons and most other large ERW detection companies and institutes.

Geometrics | U.S.A.

POWER SUPPLY

The battery is a rechargeable lead acid gel cell, 24V, magnetically compensated, giving 3 to 4 hours of use per charge for gradiometer, 8 hours for single sensor operation. The battery is worn as a belt.

FACTORY SUPPORT

- Spares are available from the Geometrics factory in San Jose, California.
- Lifetime telephone applications assistance and technical support is offered.
- Instruction manuals are available in English or Spanish.
- The manufacturer offers factory training in California or at the customer's site. The system price includes one day of training.
- The detector is available for hire.
- Two-year warranty for parts and labour.

MAINTENANCE AND SUPPORT

- Geometrics say that no maintenance is required on the G-858 other than cleaning of connectors.
- The system can be operated by one person. The company recommends two operators per system to maximise productivity and to assist in positioning of survey lines.

Cart in service

Cart with 2 sensors mounted

The G-858 system in operation

REPORTED LIMITATIONS AND STRENGTHS

The magnetometer does not perform well in highly magnetic volcanic soils (such as those in Hawaii) which mask buried object signatures near the detector.

DETECTOR

1. Brand	GEOMETRICS
2. Model	G-858
3. Version	Man carry and towable version (back pack and non-magnetic cart versoins are available)
4. Used detection technology	Self oscillationg split-beam cesium vapor (non-radioactive)

DIMENSIONAL DATA

5. Working length	
> Min. Length	2.4 m (8 feet)
> Max. Length	2.4 m (8 feet)
6. Search head	
> Size	Ø 60.32 mm | 158.75 mm long
> Weight	0.34 kg (12 ounces)
> Shape	Cylindrical
7. Transport case	
> Weight	9.5 kg (21 lbs)
> With equipment (full)	29.5 kg (65 lbs)
> Dimensions	0.81 x 0.28 x 0.41 m (32 x 11 x 16 inches)
> Hard | Soft case (material)	Hard case
8. Weight, hand-held unit	Sensor + staff + counter balance = 3 kg (6.5 lbs)
9. Weight, carrying (operational detection set)	Waist console + battery belt = 5.9 kg (13 lbs)
10. Weight, additional equipment	—
11. Weight distribution | Balance	Balanced
12. Other specifications	—

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	> 2,000 sensors | > 500 of model G-858
15. Other types | Models	Airborne and marine magnetomer types
16. Location of use	US and Hawaii, Japan, China, Europe, Cambodia, Vietnam and all theaters of war

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	None
18. Temperature (limitations)	
> Storage	-35° C to +60° C
> Operational	-15° C to +50° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes | 3 foot drop
21. Environmental Compensation	None
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	Unaffected
> medium temperature (around 20° C)	—
> high temperature (higher than 30° C)	—

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	The sensors never need calibration or alignment
> Duration	The sensors never need calibration or alignment
24. Detection range | Sensitivity details | Detection performance | Working depth	Depends on the size and the material of the object being detected, typically 2 kg at 3 m
> Small metal content (type of mine)	—
> Anti-tank mines (type of mine)	—
> ERW (please specify)	—
25. Output indicator	Daylight readable LCD display and audio tone
26. Pinpointing feature	The LCD displays the peak amplitude over the target
27. Adjustment of search head angle	Fully adjustable
28. Soil influence	Highly magnetic soils cause field distortion (Kaulave)
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Yes
30. Optimal sweep speed	Any sweep speed is ok
31. Search coil | Antenna	Omnidirectional sensor head
32. Limitations	—
33. Interference (with other detectors)	None known, certain EM gear (EM-61 will interfere with magnetometer)

POWER

34. Power supply | Source	Rechargeable battery
35. Operating time	8 h for single sensor model 3-4 h for 2 sensors gradiometer version
36. Power supply	
> weight	4.1 kg (9 lbs) (worn around waist)
> no. of batteries | size | type	Dual 12V Gel Cell, magnetically compensated
> rechargeable	Yes
> other	

COSTS

37. Price	
> for one detector on request	More than US$ 5,000
> other information regarding price	Approximately $ 18K
> reduction for higher quantity	Yes
38. System price	
> with training	1 day training included
> spare parts	Prices on request
> extended warranty	Available
39. Total	Contact factory www.geometrics.com
40. Possibility to rent/lease	Yes

OTHERS

41. Duration of warranty	One year parts and labor
42. Additional equipment	Non-magnetic carts, GPS, steering, data processing, UXO characterization software
43. Additional technical data | information	Contact factory
44. Compliant standards	Civil

SCHONSTEDT GA-52 CX AND GA-72 CD/ML

Schonstedt | U.S.A.

GENERAL DESCRIPTION

The off-the-shelf *GA magnetic detectors* manufactured by Schonstedt are fluxgate magnetometers using patented, ultra-sensitive and ultra-stable heliflux sensors. These instruments are hand held, light weight and self contained (no separate detection head). They are easy to use and reliable, providing audible and/or visual indication of the target's presence (depending on the model).

Instruments are self contained. Sensors, controls and indicators are all packaged in a light weight, hand-held unit. All models are proven detectors that have been in the market from five to 15 years.

The *GA-52 CX* provides audible indication of proximity to target by modulating the audio output frequency.

The GA-72 CD in service

Main characteristics

- piezoelectric speaker
- clear, sharp, detection signal pinpoints the target
- five individual sensitive settings
- no response to aluminium, brass, or copper
- with experience, user can distinguish between small pieces of scrap iron and actual targets
- modular construction, high performance components
- weather protected controls
- rugged lightweight carrying case.

The *GA-72 CD* provides, in addition to the same audio output, a bargraph display of signal strength and polarity, plus a measurement of the magnetic field in MGauss.

Main features

- digital readout and expanding bar graph displays signal strength and polarity
- four sensitive settings: low, medium, high and extra high
- piezoelectric speaker
- analog output for data logger entry
- 4-segment BATT LCD monitors battery charge
- modular construction, high performance components
- no response to aluminium, brass or copper.

The *GA-72 CD ML* has the same outputs as the 72 CD but comes with rechargeable lithium batteries and in desert tan colour instead of standard yellow.

WORKING METHODOLOGY

Passive detectors such as the Schonstedt models operate on the principle of magnetic fluxgate. The fluxgate consists of two sensors separated by a fixed distance and mechanically aligned. In the absence of a ferromagnetic material, the earth magnetic flux is the same at both sensors, therefore the fluxgate output is zero. When an object close to the bottom sensor alters the earth magnetic flux due to its own magnetic field, the balance of the gate is altered, producing a measurable output.

The detection range is greatly dependent on the mass and orientation of the target, ranging from a couple of centimetres to several metres.

Any object containing ferromagnetic materials (iron, steel and alloys) is detected.

POWER SUPPLY

The detectors are powered as follows:

- GA-52 CX by 2 x 9V alkaline batteries, operational life of battery: ~50 hrs;
- GA-72 CD by 2 x 9V lithium batteries; operational life of battery: ~60 hrs; and
- GA-72 CD ML by 2 x 9V lithium rechargeable batteries, operational life of battery: ~40 hrs.

The power consumption per hour is under half a Watt for each detector.

Schonstedt | U.S.A.

DETECTORS IN USE

The detectors are in service with the US Army and numerous UXO contractors, as well as government agencies, NGOs and many commercial users worldwide.

Schonstedt have sold about 90,000 of the GA-52 CX, about 20,000 of the GA-72 CD and and about 2000 of the GA-72 CD ML.

Schonstedt GA-52 CX

Schonstedt GA-72 CD/ML

FACTORY SUPPORT

- Support is normally provided as part of the purchase package.
- One-year warranty on parts and labour.
- Spare parts are available through the manufacturer or authorised dealers, but limited to those parts that do not require factory installation.
- Factory training of operators and mechanics can be provided by the manufacturer on request. It is not a standard offering, tailored for need at nominal cost. A training DVD is available.
- Instruction manuals and documentation available in English and Spanish. The website is available in English and Chinese.
- Other services are provided by Schonstedt through telephone as well as e-mail assistance.
- More information is available at the Schonstedt website.

MAINTENANCE AND SUPPORT

There are no special requirements for technicians or workshop facilities. Only a minimum of training is requested.

TEST AND EVALUATION

Schonstedt detectors have been extensively tested by the US Army and numerous EOD/UXO organisations.

The following test result is available at the ITEP website: www.itep.ws:

1. Clearance System Study Report. Norwegian People Aid, United States State Department – Office of Weapons Removal and Abatement; published 2006.

REPORTED LIMITATIONS AND STRENGTHS

Limitations

> Battery change requires opening the unit and exposing PC boards. The manufacturer plans to develop and produce a more rugged version with a separate battery compartment.

Strengths

> Commercial quality product.

DETECTOR

1. Brand	SCHONSTEDT
2. Model	GA-52 CX
3. Version	—
4. Used detection technology	Fluxgate - Patented heliflux sensor

DIMENSIONAL DATA

5. Working length	
> min. length	1.07 m
> max. length	1.07 m
6. Search head	
> Size	—
> Weight	—
> Shape	—
7. Transport case	
> Weight	0.3 kg
> With equipment (full)	1.5 kg
> Dimensions	1.20 m
> Hard | Soft case (material)	Hard (plastic)
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	1.2 kg
10. Weight, additional equipment	None
11. Weight distribution | Balance	Top heavy
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	> 90,000
15. Other types | Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	
> Storage	-25° C to +60° C
> Operational	-25° C to +60° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	None
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	Continuous
> medium temperature (around 20° C)	Continuous
> high temperature (higher than 30° C)	Continuous

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	No set up. Factory calibrated
> Duration	Indefinite
24. Detection range | Sensitivity details | Detection performance | Working depth	Target dependent, from a few cm to several meters
> Small metal content mines (type of mine)	
> Anti-tank mines (type of mine)	
> ERW (please specify)	
25. Output indicator	Sound
26. Pinpointing feature	—
27. Adjustment of search head angle	—
28. Soil influence	None, unless ferrous
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Depends
30. Optimal sweep speed	About 2 Hz
31. Search coil | Antenna	—
32. Limitations	—
33. Interference (with other detectors)	With surrounding ferrous metals

POWER

34. Power supply | Source	Batteries
35. Operating time	40 hrs
36. Power supply	
> weight	—
> no. of batteries | size | type	2.9V, alkaline
> rechargeable	No
> other	

COSTS

37. Price	
> for one detector on request	Less than US$ 1,000
> reduction for higher quantity	Yes
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	1 year
42. Additional equipment	Accessories
43. Additional technical data | information	
44. Compliant standards	

DETECTOR

1. Brand	SCHONSTEDT
2. Model	GA-72 CD-ML
3. Version	—
4. Used detection technology	Fluxgate - Patented heliflux sensor

DIMENSIONAL DATA

5. Working length	
> min. length	0.88 m
> max. length	0.88 m
6. Search head	
> Size	—
> Weight	—
> Shape	—
7. Transport case	
> Weight	0.3 kg
> With equipment (full)	1.5 kg
> Dimensions	1.10 m
> Hard | Soft case (material)	Hard (plastic)
8. Weight, hand-held unit	1.2 kg
9. Weight, carrying (operational detection set)	1.2 kg
10. Weight, additional equipment	None
11. Weight distribution | Balance	Top heavy
12. Other specifications	

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	> 2,000
15. Other types | Models	—
16. Location of use	Worldwide

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	—
18. Temperature (limitations)	
> Storage	-25° C to +60° C
> Operational	-25° C to +60° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	None
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	Continuous
> medium temperature (around 20° C)	Continuous
> high temperature (higher than 30° C)	Continuous

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	No set up. Factory calibrated
> Duration	Indefinite
24. Detection range | Sensitivity details | Detection performance | Working depth	Target dependent, from a few cm to several meters
> Small metal content mines (type of mine)	
> Anti-tank mines (type of mine)	
> ERW (please specify)	
25. Output indicator	Sound and display
26. Pinpointing feature	—
27. Adjustment of search head angle	—
28. Soil influence	None, unless ferrous
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Depends
30. Optimal sweep speed	About 2 Hz
31. Search coil | Antenna	—
32. Limitations	—
33. Interference (with other detectors)	With surrounding ferrous metals

POWER

34. Power supply | Source	Batteries
35. Operating time	40 hrs
36. Power supply	
> weight	—
> no. of batteries | size | type	2.9V, alkaline
> rechargeable	Yes
> other	

COSTS

37. Price	
> for one detector on request	Between US$ 1,000 and US$ 2,000
> reduction for higher quantity	Yes
38. System price	
> with training	
> spare parts	
> extended warranty	
39. Total	
40. Possibility to rent/lease	No

OTHERS

41. Duration of warranty	1 year
42. Additional equipment	Accessories
43. Additional technical data | information	
44. Compliant standards	

VALLON EL1302-D2 AND EL1303-D2

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon EL1302-D2 ferrous locator* is a highly sensitive difference magnetometer used for the detection of bombs, shells, mortar projectiles and other unexploded ordnance. It indicates any disturbance caused in the earth's magnetic field by buried ferrous objects, providing indications to the operator both acoustically and visually. The *EL1302-D2* is used for land-based detection while the *EL1303-D2* is used for detection on land and under water and in boreholes.

The detectors are designed for all-weather use, using glass fibre and carbon fibre materials to reduce its weight. They are equipped with a digital signal output for direct connection via cable or via Bluetooth[1] to Vallon data loggers and for direct data recording in conjunction with a commercial laptop computer running the Vallon EVA2000 software. To relate the exact x-y co-ordinates to the measured data, the Vallon sensor positioning system (SEPOS)[2] or a DGPS[3] receiver with antenna can be connected.

Operation is simple, with only a short training period required before operation.

Vallon EL1302-D2

Vallon EL1303-D2

1 Bluetooth is a registered trade mark of Bluetooth SIG, Inc., 500 108th Avenue NE, Suite 250, Bellevue, WA 98004, USA

2 SEPOS is trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

3 DGPS is a Differential Global Positioning System, various brands, providing NMEA-GGA data, can be used.

Main components are

- electronics unit with battery compartment
- sensor part with carrying bar and control unit
- non-magnetic headset
- carrying belt
- one set (6 EA) round cells 1.5V IEC R 14 alkaline C-cell
- operation manual
- aluminium shipping and storage case for EL1302-D2 or plastic hard case for EL1303-D2.

The detector complies to environmental conditions according to MIL STD 810F 501.3, 502.3, 503.3, 506.3, 514.4.

WORKING METHODOLOGY

The Vallon differential magnetometers work on the principle of measuring the distortion of the earth magnetic field. Two sensors for the magnetic field, which are adjusted for the machine's lifetime, are vertically mounted in a tube 50 cm apart to measure the earth's magnetic field. Both values are subtracted and result in zero. A ferromagnetic target disturbs the homogenous field and results in two different values so that the difference is not zero. Depending on the signal amplitude and polarity the alarm signal is computed.

DETECTORS IN USE

The locators are in service with many commercial ordnance disposal organisations, several NATO partners and other armed forces.

POWER SUPPLY

The two models are powered by six 1.5V round cells IECR14 alkaline or rechargeable 1.2V Ni-MH batteries RSH 1.8. The operational life of batteries is said to be approximately 60 - 80 hours with alkaline batteries without the data logger and depending on age, quality and capacity of the batteries.

Vallon | Germany

FACTORY SUPPORT

- Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- Operation and maintenance manuals are available in different languages.
- Warranty of 24 months.

Vallon EL1302-D2 cable free data logger

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.

The EL1303D with accessories

The EL1303D

TEST AND EVALUATION

Several test reports are available from the manufacturer on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only.

TECHNICAL SPECIFICATIONS	VALLON
DETECTOR	
1. Brand	VALLON
2. Model	EL 1302-D2
3. Version	D2
4. Used detection technology	Difference magnetometer using fluxgate principle
DIMENSIONAL DATA	
5. Working length	Approx. 135 cm
6. Search head	
> Size	Length approx. 60 cm | Ø approx. 3.2 cm
> Weight	Approx. 4 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 6.3 kg
> With equipment (full)	Approx. 12 kg
> Dimensions	79 x 29 x 14 cm
> Hard | Soft case (material)	Hard case | aluminium
8. Weight, hand-held unit	Approx. 4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 4 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution | Balance	Balanced around the hand grip
12. Other specifications	–
SYSTEM STATUS AND DEPLOYMENT	
13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	Not given
15. Other types | Models	EL 1303D2 | VET2 | VXC1 | VMXC1 VMXC1-3
16. Location of use	Worldwide
ENVIRONMENTAL INFLUENCE	
17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31°C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Auto, cannot be used in magnetic soil
22. Operational hours | Operating endurance	
> low temperature (around 0°C)	–
> medium temperature (around 20°C)	60 - 80 h without bluetooth® and approx. 30 h with bluetooth® with alkaline batteries depending on operation periods
> high temperature (higher than 30°C)	–

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual | Automatic
> Duration	A few seconds
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil | Antenna	Tube with Ø 35 mm
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply | Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	6 batteries approx. 400 g
> no. of batteries | size | type	6 ea. 1.5V round cells (IEC R 14) C-size
> rechargeable	6 ea. 1.2V NI-MH batteries RSH 1.8
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform
43. Additional technical data | information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

DETECTOR

1. Brand	VALLON
2. Model	EL 1303-D2
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Approx. 1350 mm
6. Search head	
> Size	Length approx. 600 mm | Ø approx. 3.2 cm
> Weight	Approx. 0.6 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 9.5 kg
> With equipment (full)	Approx. 20 kg (including cable drum)
> Dimensions	80 x 52 x 31 cm
> Hard | Soft case (material)	Hard case | plastic
8. Weight, hand-held unit	Approx. 4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 3.8 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution | Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	Not given
15. Other types | Models	EL 1302D2 | VET2 | VXC1 | VMXC1 VMXC1-3
16. Location of use	Worldwide | land, water, borehole

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes, sensor tube 60 m
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Manual cannot be used in magnetic soil
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	–
> medium temperature (around 20° C)	60 - 80 h without bluetooth® and approx. 30 h with bluetooth® with alkaline batteries depending on operation periods
> high temperature (higher than 30° C)	–

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual | Automatic
> Duration	A few seconds
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil | Antenna	Tube with Ø 32 mm
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply | Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	6 batteries approx. 400 g
> no. of batteries | size | type	6 ea. 1.5V round cells (IEC R 14) C-size
> rechargeable	6 ea. 1.2V NI-MH batteries RSH 1.8
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform, cable for deep underwater detection
43. Additional technical data | information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

VALLON VET2

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VET2 ferrous locator* is a highly sensitive difference magnetometer designed for the detection of bombs deep in the ground. The large distance between the sensors of the VET2 (170 cm) enables the detection of field strength differences produced by very deeply buried objects and is mainly used for the examination of the subsoil. The manufacturer recommends an initial area survey using a standard ferrous locator in order to clear ferromagnetic objects up to a depth of 2-3 m.

The locator monitors the earth's magnetic field and signals visually or acoustically any disturbances of the field by buried ferrous objects. During conventional detection the measured data are read off the indication meter.

By connecting the Vallon field computers VFC1 or VFC2 the measured data can be stored, displayed as graphs and subsequently evaluated. To relate the exact x-y coordinates to the measured data the Vallon sensor positioning system (SEPOS)[1] or a digital global positioning system (DGPS)[2] receiver with antenna can be connected.

On completion of the survey, the recorded data are downloaded to the laptop or PC running the VALLON EVA2000 software. The operator can then evaluate any suspected unexploded ordnance targets. A complete target list and true-to-scale map can be printed out for follow-up operations. Both the lists and maps indicate the field and each target by its DGPS position in latitude and longitude.

Operation is simple, with only a short training period required before operation.

Vallon VET2

Main components are

- electronics unit with LED display
- sensor part with carrying bar
- handle
- non-magnetic headset
- carrying system
- accumulator block with charger
- operation manual
- aluminium shipping and storage case for VET2
- robust textile bag for the carrying system with accessories.

The detector complies with environmental conditions according to MIL STD 810F 501.3, 502.3, 503.3, 506.3, 514.4.

1 SEPOS is a registered trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

2 Various brands of DGPS exist: for use with Vallon they need to be able to read NMEA-GGA data.

WORKING METHODOLOGY

The Vallon differential magnetometers work on the principle of measuring the distortion of the earth magnetic field. Two sensors for the magnetic field, which are adjusted for the machine's lifetime, are vertically mounted in a tube 170 cm apart to measure the earth's magnetic field. Both values are subtracted and result in zero. A ferromagnetic target disturbs the homogenous field and results in two different values so that the difference is not zero. Depending on the signal amplitude and polarity the alarm signal is computed.

DETECTORS IN USE

The locators are in service with many commercial ordnance disposal organisations, several NATO partners and other armed forces.

POWER SUPPLY

The VET2 is powered by a rechargeable battery set 12V DC.

FACTORY SUPPORT

- Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- Operation and maintenance manuals are available in different languages.
- Warranty of 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only, thus non-magnetic metal objects, ie, aluminium foil, cans, etc, are excluded.

DETECTOR

1. Brand	VALLON
2. Model	VET2
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle

DIMENSIONAL DATA

5. Working length	Approx. 1.2 m
6. Search head	
> Size	Length approx. 203 cm | Ø approx. 3.5 cm
> Weight	Approx. 1.7 kg
> Shape	Tube
7. Transport case	
> Weight	Approx. 16.3 kg
> With equipment (full)	Approx. 22 kg
> Dimensions	203 x 34 x 23 cm
> Hard | Soft case (material)	Hard case | aluminium
8. Weight, hand-held unit	Approx. 9 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 9 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution | Balance	Balanced around the hand grip
12. Other specifications	–

SYSTEM STATUS AND DEPLOYMENT

13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	Not given
15. Other types | Models	EL 1302D2 | EL 1303D2 | VET2 | VXC1
16. Location of use	Worldwide | land, water, borehole

ENVIRONMENTAL INFLUENCE

17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Manual cannot be used in magnetic soil
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	–
> medium temperature (around 20° C)	Approx. 30 h
> high temperature (higher than 30° C)	–

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual | Automatic
> Duration	A few seconds
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by indication meter, optional real-time-display on screen of data logger or PC with evaluation software VALLON EVA2000®
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0–2 m/s
31. Search coil | Antenna	Tube with 35 mm Ø
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply | Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	Approx. 3.4 kg
> no. of batteries | size | type	Accumulator set 12V
> rechargeable	Accumulator set 12V
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Data logger, evaluation software, DGPS, sensor positioning system SEPOS®, multisensor platform, GPS
43. Additional technical data | information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810E, 501.3, 502.3, 503.3, 506.3, 514.4 MIL STD 461D

VALLON VXC1

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VXC1 differential magnetometer* is a very compact portable and robust instrument for explosive ordnance detection on land and in shallow waters. Due to its compact and lightweight construction it is highly recommended for detection work in dense vegetation and during digging activities.

The modern electronics are designed to withstand all typical environmental and vibration requirements and meet MIL STD 810F. Detected objects are clearly indicated by audio signal and the LED bargraph in the hand grip.

Operator controls are limited to a mode selector and three push buttons for sensitivity level, audio signal volume and compensation/ground balance. The detector can be used with minimal operator training.

The VXC1

Main components are

- locator VXC1
- one set (2 EA) single-cell batteries IEC R20/D-cell
- operation manual
- field backpack.

Optional accessories (available on request) include a headset and a hard case.

The detector complies to environmental conditions according to MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1.

WORKING METHODOLOGY

The Vallon differential magnetometer measures the distortion of the earth's magnetic field by ferromagnetic items through two sensors – adjusted for machine's lifetime – vertically mounted in a tube 30 cm apart. Normally both values are subtracted and result in zero. When a ferromagnetic target disturbs the homogenous field the difference in two values is not zero. Depending on the signal amplitude and polarity the alarm signal is computed and indicated.

DETECTORS IN USE

The locators are in service with various humanitarian and commercial mine clearance organisations.

POWER SUPPLY

- VXC1 is powered by two 1.5V single-cells IECR20 or rechargeable 1.24 V Ni-MH batteries RSH 4KR.
- The operational life of batteries is said to be approximately 120 hours with alkaline batteries depending on age, quality and capacity of the batteries.

FACTORY SUPPORT

- Vallon runs a worldwide servicing network with all current spare parts in stock. Spare parts can be delivered with a corresponding maintenance manual directly to the customer for on-site repair.
- Operation and maintenance training are offered either in the Vallon facilities or at a location required by the customer.
- Operation and maintenance manuals are available in different languages.
- Warranty for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The sensors do not need any adjustment.

VXC1 with accessories

VXC1 display LED

VXC1 mode selector

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only.

TECHNICAL SPECIFICATIONS	VALLON
DETECTOR	
1. Brand	VALLON
2. Model	VXC1
3. Version	–
4. Used detection technology	Difference magnetometer using fluxgate principle
DIMENSIONAL DATA	
5. Working length	Adjustable from 56 to 90 cm
6. Search head	
> Size	Length approx. 46 cm | Ø approx. 3.8 cm
> Weight	Approx. 2.4 kg
> Shape	Tube
7. Transport case	
> Weight	**Field backpack** approx. 1 kg (standard accessory) **Hard case** approx. 4.9 kg (optional accessory)
> With equipment (full)	**Field backpack with equipment** (full) approx. 3.5 kg (standard accessory) **Hard case with equipment** (full) approx. 8.4 kg (optional accessory)
> Dimensions	**Field backpack** (standard accessory) 53 x 29 x 12 cm **Hard case** (optional accessory) 55 x 35 x 23 cm
> Hard | Soft case (material)	**Field backpack** (standard accessory) | Textile **Hard case** (optional accessory) | Plastic
8. Weight, hand-held unit	Approx. 2.4 kg (with batteries)
9. Weight, carrying (operational detection set)	Approx. 2.4 kg (with batteries)
10. Weight, additional equipment	Head set 110 g
11. Weight distribution | Balance	Balanced around the hand grip
12. Other specifications	–
SYSTEM STATUS AND DEPLOYMENT	
13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	Not given
15. Other types | Models	EL1302D2 | EL1303D2 | VET2 VMXC1 | VMXC1-3
16. Location of use	Worldwide
ENVIRONMENTAL INFLUENCE	
17. Humidity (limitations)	According to MIL STD 810F
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Manual, cannot be used in magnetic soil
22. Operational hours | Operating endurance	Medium temperature (around 20°C) Approx. 120 h with alkaline batteries depending on operation periods

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Manual | Automatic
> Duration	A few seconds
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity switch
> Small metal content mines (type of mine)	No
> Anti-tank mines (type of mine)	Depending on their size, material and the local interference
> ERW (please specify)	Depending on their size, material and the local interference
25. Output indicator	Audio by inbuilt loudspeaker or headset, visual by LED-bargraph
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Yes
28. Soil influence	See item 29
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	0 – 1 m/s
31. Search coil | Antenna	Tube with 38 mm Ø
32. Limitations	Only ferromagnetic targets
33. Interference (with other detectors)	Same detector type no

POWER

34. Power supply | Source	Battery
35. Operating time	See point 22
36. Power supply	
> weight	2 batteries approx. 100 g
> no. of batteries | size | type	2 ea. 1.5V single-cell batteries IEC R20/D-size
> rechargeable	2 ea. 1.24V (RSH 4 KR35/62, D-size)
> other	–

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Yes
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Upon request
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Hard case, headset
43. Additional technical data | information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1 MIL STD 461D

VALLON VXV4 OR VXV8

Vallon | Germany

GENERAL DESCRIPTION

The *Vallon VXV4/VXV8 sensor platforms* with up to four or eight highly sensitive ferrous locators were developed for the detection of unexploded ordnance (UXO) over large areas.

The vehicle incorporates an array of ferrous locators operating with the Vallon field computer VFC2 or a laptop PC as data logger. To relate the exact x-y coordinates to the measured data the Vallon sensor positioning system (SEPOS)[1] or a digital.)global positioning system (DGPS)) receiver with antenna can be connected.

The VXV4 carries standard up to four Vallon ferrous sensors for land use and the VXV8 has eight ferrous sensors. Other special vehicles are required to carry the locators on or under water.

After survey all data are transferred to a laptop or a PC and evaluated using the VALLON EVA2000 software package.

3 sensors mounted at vehicle

Main components are

- 4/8 fluxgate sensors
- central electronics VCU2 unit in a weatherproof housing
- customised sensor platform for fluxgate sensors for land and/or under water use
- battery pack
- data logger: VFC2 or laptop PC
- portable laptop with USB memory stick, data transfer cable and 12 V DC-adapter
- VALLON EVA2000 2.X. software
- DGPS system.

[1] SEPOS is a registered trade mark of Vallon GmbH for the patented positioning system for land survey and borehole detection with ferrous locators.

WORKING METHODOLOGY

The complete version comprises a platform with fluxgate sensors. Several differential magnetometers are arranged in one array across the walking/driving direction on a special frame. The sensors detect interferences of the normally homogenous magnetic field of the earth. Steel and iron objects in the ground or in the water affect the earth's magnetic field.

Data recording is made directly by connecting the sensor electronics to a laptop using MS Windows 2000/XP/Vista and the VALLON EVA2000 2.X software. The software can simultaneously record data from the sensors and DGPS. During data survey, the measured values are displayed in real time and the covered distance is displayed in real time for navigation.

DETECTORS IN USE

The system is in operation worldwide with commercial UXO clearance operators.

POWER SUPPLY

The detection system works with its own battery or external 12V DC supply.

FACTORY SUPPORT

The manufacturer offers operation and maintenance training at their facilities or on-site worldwide. Spare parts can be supplied in very short time. Warranty is for 24 months.

MAINTENANCE SUPPORT

There are no special requirements for technicians or workshop facilities. All tools needed are standard and available in most workshops. The maintenance manual has step-by-step explanations for repairs.

TEST AND EVALUATION

The manufacturer allows access to test reports on request.

REPORTED LIMITATIONS AND STRENGTHS

Detection of ferrous targets only. Thus non-magnetic metal objects, ie, aluminium foil, cans, etc, are excluded.

TECHNICAL SPECIFICATIONS	VALLON
DETECTOR	
1. Brand	VALLON
2. Model	VXV4
3. Version	Vehicle Mounted Multi Sensor System (customized solutions)
4. Used detection technology	Difference magnetometer (fluxgate)
DIMENSIONAL DATA	
5. Working length	Depending on the customer's requirements
6. Search head	
> Size	Customized from 1 to 4 m detection width
> Weight	Depending on the construction
> Shape	Rectangle
Protective spoiler	
> Size	Depending on search head size
> Weight	Depending on search head size
> Shape	Depending on search head size
7. Transport case	
> Weight	Depending on the customer's requirements
> With equipment (full)	Depending on the customer's requirements
> Dimensions	Depending on the customer's requirements
> Hard | Soft case (material)	Wooden case
8. Weight, hand-held unit	–
9. Weight, carrying (operational detection set)	–
10. Weight, additional equipment	–
11. Weight distribution | Balance	–
12. Other specifications	
SYSTEM STATUS AND DEPLOYMENT	
13. Status (Development | In production)	In production
14. Detectors | Systems in use to date	Not given
15. Other types | Models	VMXV4 for UXO and mine detection or VMV8 for mine detection only
16. Location of use	Worldwide | land, water, borehole
ENVIRONMENTAL INFLUENCE	
17. Humidity (limitations)	According to MIN STD 810E
18. Temperature (limitations)	
> Storage	-51° C to +71° C
> Operational	-31° C to +63° C
19. Water resistant (Yes / No)	Yes up to 5 m (search head)
20. Shock | Vibration resistant	Yes
21. Environmental Compensation	Auto
22. Operational hours | Operating endurance	
> low temperature (around 0° C)	Depending on the customer's requirements
> medium temperature (around 20° C)	Depending on the customer's requirements
> high temperature (higher than 30° C)	Depending on the customer's requirements

DETECTION OPERATION

23. Calibration | Set-up	
> Auto | Manual	Automatic
> Duration	A few seconds
24. Detection range | Sensitivity details | Detection performance | Working depth	
> Control of working depth	Sensitivity adjustment
> Small metal content mines (type of mine)	Not applicable, UXO detector
> Anti-tank mines (type of mine)	Depends on the construction
> ERW (please specify)	Depends on the construction
25. Output indicator	Alarm sound and visual display on PC screen
26. Pinpointing feature	Yes
27. Adjustment of search head angle	Manual
28. Soil influence	Automatic and adjustable
29. Best use in	
> Sand	Yes
> Peat	Yes
> Clay	Yes
> Ferruginous soil (laterite)	Limited
30. Optimal sweep speed	Depending on used sensors up to 10 km/h
31. Search coil | Antenna	Fluxgate
32. Limitations	–
33. Interference (with other detectors)	–

POWER

34. Power supply | Source	Battery pack or separated car/truck battery
35. Operating time	15 h, car/truck battery: unlimited
36. Power supply	
> weight	–
> no. of batteries | size | type	Vehicle battery or own rechargeable battery
> rechargeable	Yes
> other	Works with 12V DC

COSTS

37. Price	
> for one detector on request	Upon request
> reduction for higher quantity	Upon request
38. System price	
> with training	Upon request worldwide
> spare parts	Upon request
> extended warranty	Max 24 months
39. Total	–
40. Possibility to rent/lease	Upon request

OTHERS

41. Duration of warranty	24 months
42. Additional equipment	Depending on the customer's requirements
43. Additional technical data | information	–
44. Compliant standards	DIN EN ISO 9001:2000 MIL STD 810F, 501.4-II, 502.4-I, 502.4-II, 503.4, 506.4-III, 514.5 C1