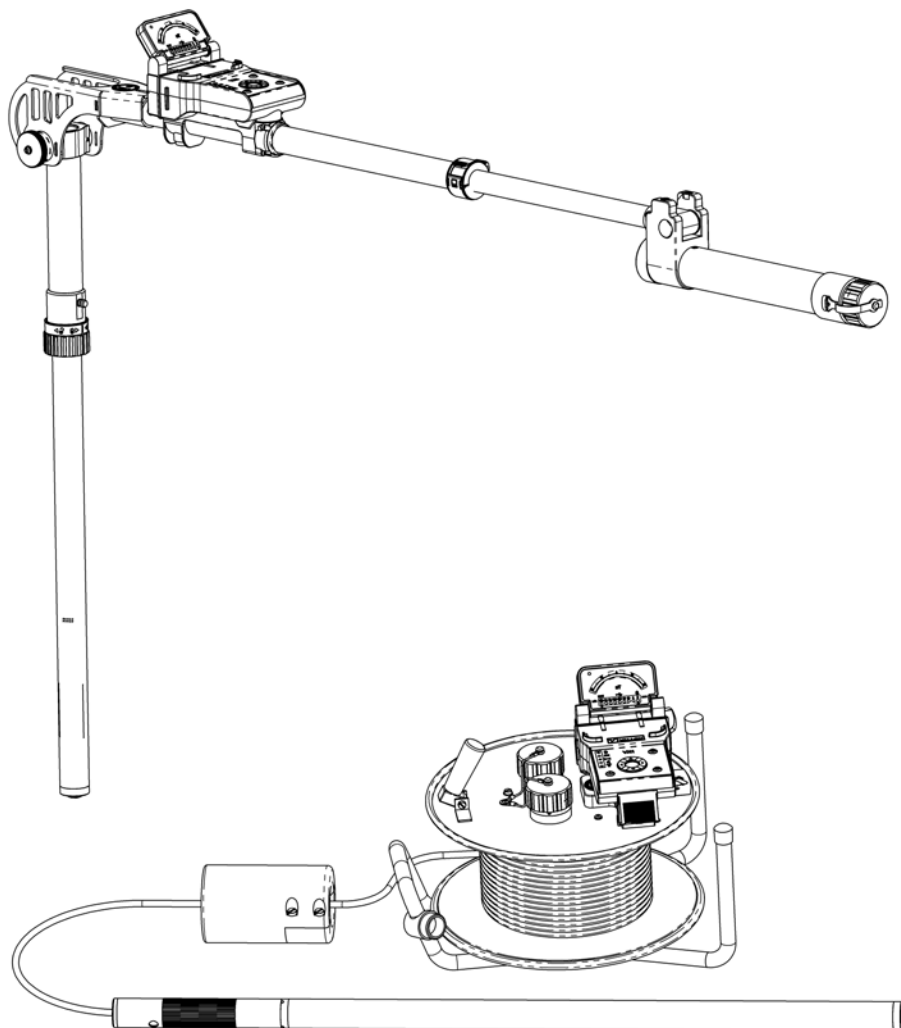


FERROUS LOCATOR

VX1



OPERATION MANUAL

Issue EN 02/2023

Firmware 1.6

Contents

1	Before starting	3
2	Symbol explanation	4
2.1	Symbols in the operation manual	4
3	Safety information	5
3.1	Intended use	5
3.2	Electromagnetic compatibility	5
3.3	Warnings	6
4	Description	7
4.1	General	7
4.2	Working principle	7
4.3	Assembly	8
4.3.1	Borehole detection	8
4.3.2	Surface detection	10
4.4	Control unit	12
4.4.1	Display	12
4.4.2	Measuring scale	12
4.4.3	Adjustment display	12
4.4.4	Function LEDs	13
4.4.5	Keys	13
4.5	Interfaces / ports	15
4.5.1	DATA interface	15
4.5.2	SEPOS® interface	16
4.6	Power supply	17
4.6.1	Internal Battery Compartment	17
4.6.2	External Battery Compartment	18
5	Setup	19
5.1	Setup for surface detection with carrying bar	19
5.2	Setup for borehole and underwater detection	22
5.2.1	Cable guard	23
5.3	Unplugging of the probe connector	23
5.4	Selecting the DATA interface	24
6	Operation	25
6.1	Practical considerations	25
6.1.1	Before Detection Work	25
6.1.2	During Detection Work	25
6.2	Switching on the VX1	26
6.2.1	Probe adjustment and acclimatization	26
6.3	Settings and functions	27
6.3.1	Data transfer	27
6.3.2	Battery status	27
6.3.3	Measuring range	28

6.3.4	Volume	28
6.3.5	Filter	29
6.4	Signal evaluation	30
6.4.1	Acoustic signals	30
6.4.2	Display signals	31
6.4.3	Typical signals during operation	33
6.5	Determination of object depth using the depth table	35
6.6	Computer-aided detection	36
6.6.1	SEPOS	36
6.6.2	GNSS (Global Navigation Satellite System)	36
7	Troubleshooting	37
8	Maintenance and storage	39
9	Technical data	41
10	Legal information	44
10.1	Patents and third party rights	44
10.2	Warranty	44
10.3	Device disposal	44
10.4	Battery disposal	45
10.5	EC Declaration of conformity	46

1 Before starting

Thank you for purchasing one of our leading-edge products. Our company, which has been certified in accordance with ISO 9001 by an independent testing institute, stands for highest quality in the development and manufacturing of devices, assemblies and PC applications.

The technology and the equipment are state-of-the-art regarding their functionality and safety in accordance with national and international requirements. Further developments and improvements are continuously taken into account. Therefore, the figures, technical data, and general contents specified in this document may change due to adjustment to new findings¹.



This operation manual is designed to help you to use our product with its versatile possibilities optimally and safely.

This is why we ask you to read this manual thoroughly prior to putting the product into operation. Always keep this manual near the product so that it is quickly available when needed.

Please do not hesitate to contact us if you have any further questions.

¹All details as stated in this document comply with the technical standard that is applicable at the date of printing. It is subject to technical modifications and error.

2 Symbol explanation

2.1 Symbols in the operation manual

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.



Information

Useful Information

3 Safety information

3.1 Intended use

The ferrous locator VX1 is used for the detection of ferrous objects such as unexploded ordnance (UXO) in the ground or in shallow water.

Due to limitations of the physical measuring principle the VX1 is not applicable for mine detection.

Under normal conditions of use, the ferrous locator VX1 is harmless to humans. Only persons carrying a cardiac pacemaker or similar medical equipment in or on their body must avoid direct contact of the locator probe.

3.2 Electromagnetic compatibility

This device corresponds to class A according to guideline **2014/30/EU** (26.2.2014). While using the device, weak electromagnetic fields will be created, which have an impact on the environment of the device. In the worst case, other electronic devices may be disturbed by these fields. The function of this device may also be disturbed by electromagnetic fields of other devices.

3.3 Warnings

WARNING

Explosion Hazard

- ▷ With the ferrous locator VX1 you only can find objects that contain ferro-magnetic parts (such as iron, cast iron or steel) and are sufficiently magnetized.
- ▷ Ensure that the target objects can be detected reliably with the set configuration.
- ▷ Due to limitations of the physical measuring principle the VX1 is not suitable for mine detection. The searching area must be free of mines and safe for walking-on.
- ▷ When searching for ordnance: Do not touch any objects such as stones, twigs, wires or ordnance with the search probe.

CAUTION

Risk of hearing damage due to high volumes!

- ▷ Do not use the headphone at high volume settings.

4 Description

4.1 General

The Ferrous Locator VX1 is a compact and robust differential magnetometer with high sensitivity and will be used for searching anomaly masses in the homogeneous earth's field (e.g. bombs, grenades etc.).

The measurement result concerning polarity and strength is shown on a display.

The control unit of the VX1 has data interfaces for computer-aided detection (RS232, USB and Bluetooth®).

4.2 Working principle

The earth magnetic field usually has uniform field intensity and direction. When a ferromagnetic object is exposed to this magnetic field, the magnetic field of the object superimposes the earth magnetic field and there is a local inhomogeneity. The farther from the ferromagnetic object, the lower its influence. A ferrous locator that shows disturbances of the earth magnetic field can indicate hidden magnetic objects. In a differential magnetometer two magnetic field sensors are arranged in a way so that the measured field strength is zero when both sensors are experiencing the same magnetic field strength as it is in the earth magnetic field.

If there are disturbances of the earth magnetic field, e.g. caused by a ferromagnetic object, the magnetic fields influencing the sensors in the probe will have different strengths and directions. Now the ferrous locator generates a signal which is proportional to the field strength difference. Several factors contribute to the extent of the field disturbance: most important are the size and magnetic state of the detected object. These factors influence the sensitivity limits of the ferrous locator: the larger the ferromagnetic object, the larger the distance from which the ferrous locator can locate it.

4.3 Assembly

4.3.1 Borehole detection

The following table shows the necessary parts for borehole detection (see also fig. 4.3.1). The described parts are included in the sets *VX1 Borehole complete* (part no. 2003170003) and *VX1 Borehole SEPOS complete* (part no. 2003170007).

Pos.	Name	Part no.
1	Cable drum VX1 complete with 25 m probe cable (other cable lengths on request) Only in set <i>VX1 Borehole complete</i> !	2903170260
1	Cable drum VX1 SEPOS® complete with 15 m probe cable (other cable lengths on request) Only in set <i>VX1 Borehole SEPOS® complete</i> !	2903170470
2	Digital probe VSM medium (red head)	2909990674
2	Digital probe VSM4 medium (green head)	2005320010
3	Transport container VSM	2903170450
4	Control unit VX1-CU	2903170040
5	Ring screw	2909990105
6	Hook wrench	9150006024
7	Additional weight	2909990631
8	Alkaline battery type LR20 (D/Mono), 4 pcs.	5910001006
9	Connection cable SEPOS®-borehole VX1 3 m Only in set <i>VX1 Borehole SEPOS® complete</i> !	2503170040
10	SEPOS®-detector borehole Only in set <i>VX1 Borehole SEPOS® complete</i> !	2900130130
11	Case cable drum	2903170401
12	Operation manual (no figure)	2093170330
13	Field manual (no figure)	2903170750

Additional sets and options for borehole detection

In addition to the sets *VX1 Borehole complete* and *VX1 Borehole SEPOS complete* there are other sets, e.g. to supplement already existing sets. There are also various options, e.g. surface detection, data acquisition with field computer, data evaluation with Vallon EVA[®] software, etc. Please contact us for more information.



Fig. 4.3.1: Assembly for borehole detection: (1) Cable drum with probe cable; (2) Probe VSM medium; (3) Transport case VSM; (4) Control unit VX1-CU; (5) Ring screw; (6) Hook wrench; (7) Additional weight; (8) Alkaline batteries type LR20 (D/Mono); (9) Connection cable SEPOS[®]-borehole; (10) SEPOS[®]-detector borehole; (11) Transport case cable reel

4.3.2 Surface detection

The following table shows the necessary parts for surface detection with carrying bar (see also fig. 4.3.2). The set *VX1 Surface complete* (part no. 2003170000) contains the described parts.

Pos.	Name	Part no.
1a	Carrying bar VX1-CB	2903170030
1b	Control unit VX1-CU	2903170040
1c	Digital probe VSM medium (red head)	2909990674
1c	Digital probe VSM4 medium (green head)	2005320010
2	Carrying belt	8903170820
3	Non-magnetic headset with textile strap	2903170320
4	Alkaline battery type LR20 (D/Mono), 4 pcs.	5910001006
5	Backpack VX1	8903170610
6	Transport case VX1 splash-water tight	2903170410
7	Operation manual (no figure)	2093170330
8	Field manual (no figure)	2903170750

Further sets and options for surface detection

In addition to set *VX1 Surface complete* there are other sets, e.g. to supplement already existing sets. There are also various options, e.g. multi channel surface detection, data acquisition with field computer, data evaluation with Vallon EVA[®] software, etc. Please contact us for more information.



Fig. 4.3.2: Assembly for surface detection: (1) Carrying bar VX1-CB, Control unit VX1-CU, Digital probe VSM medium; (2) Carrying belt; (3) Headset; (4) Alkaline battery type LR20 (D/Mono); (5) Backpack VX1; (6) Transport case

4.4 Control unit

4.4.1 Display

The display consists of a measuring scale with 41 LEDs and an adjustment display with 9 LEDs.

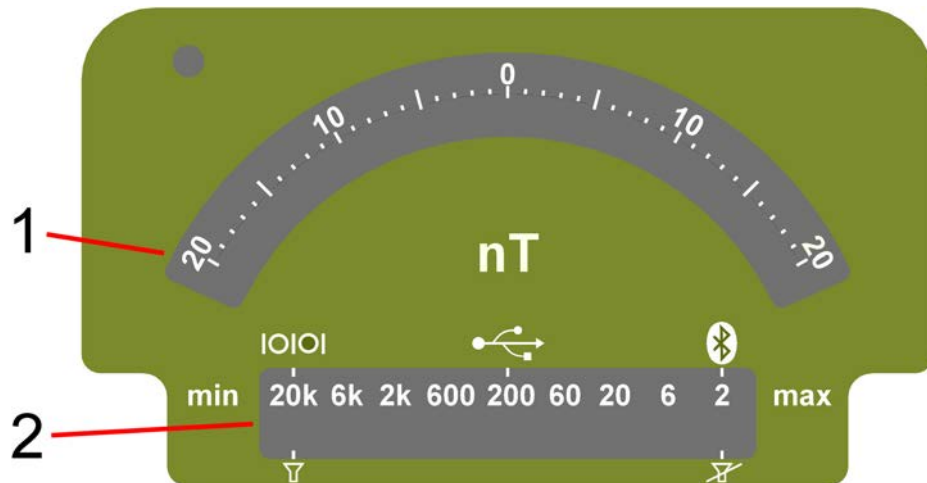


Fig. 4.4.1: Display: (1) Measuring scale; (2) Adjustment display

4.4.2 Measuring scale

The measuring scale consist of 41 LEDs from -20 (left) to +20 (right). When the detector is compensated, LED 0 is constantly illuminated. If the detector locates a ferromagnetic object, an LED on the left or the right of the display gets lit depending on the polarity of the magnetic field. Value and duration of the deflection indicate the object's size and its distance to the detector.

4.4.3 Adjustment display

The adjustment display indicates the set value of the selected parameter. In detection mode this is the measuring range.

4.4.4 Function LEDs

The function LEDs next to the function keys show the selected function parameter, see also section [Settings and functions](#) on page 27.

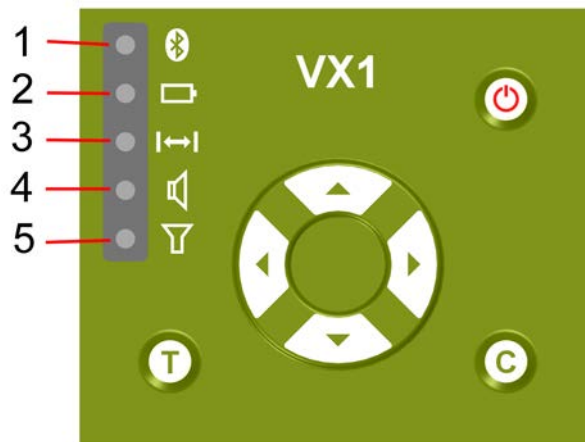


Fig. 4.4.2: Function LEDs: (1) Interface; (2) Battery status; (3) Measuring range (detection mode); (4) Volume; (5) Filter

4.4.5 Keys

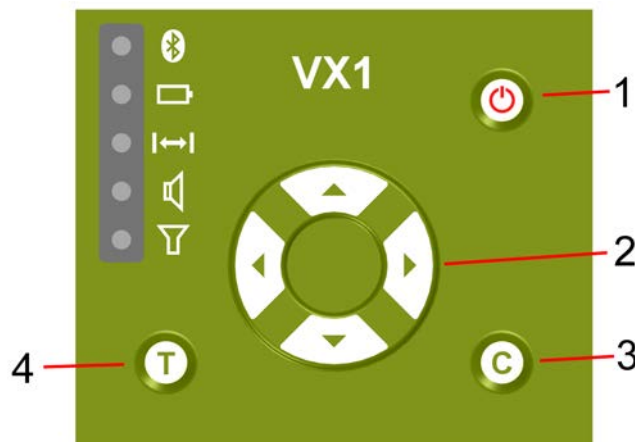


Fig. 4.4.3: Keys: (1) ON/OFF key; (2) Cursor keys; (3) COMP key; (4) TEST key

Key ON/OFF

Press the ON/OFF key for 3 – 4 seconds to turn the detector on. Upon completion of the power-up procedure LEDs are illuminated. To turn the detector off press the ON/OFF until all LEDs go dark.

Key COMP

By briefly pressing key COMP the automatic compensation starts. Herewith the field strength difference measured by the detector gets evened out. During compensation LED 0 is flashing and a high-frequency sound is emitted. When the automatic compensation has been finished, LED 0 is constantly illuminated and the VX1 is operational.

**Information**

When LED 0 is flashing constantly, the compensation range has been exceeded.

Key TEST

By pressing key TEST an artificial field strength difference is generated directly at the probe. After signal processing the display shows a deflection of 20 scale degrees and a low-frequency sound is emitted.

Cursor Keys

With the cursor keys (UP, DOWN, LEFT, RIGHT) the desired function and the function value is chosen. The detector has 5 adjustable function parameters (Interface (RS232, USB, Bluetooth®).), Battery Status, Display Scaling (sensitivity), Volume, Filter). Select the desired function with the keys UP and DOWN. Change the function value with the keys LEFT and RIGHT.

4.5 Interfaces / ports

There are three ports at the VX1 control unit.

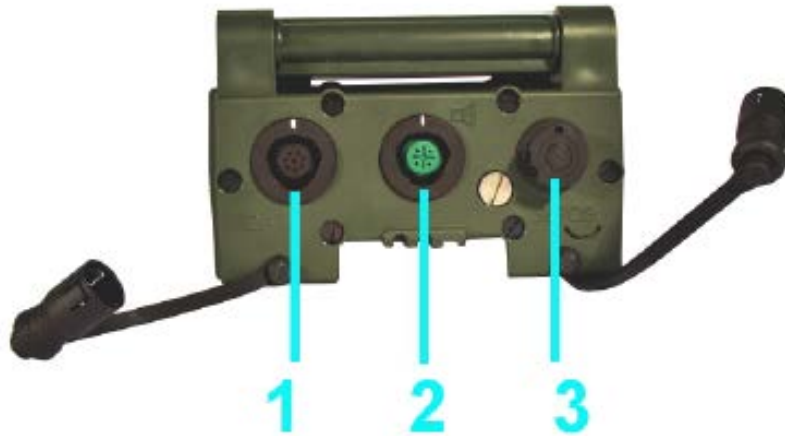


Fig. 4.5.1: Ports: (1) DATA interface; (2) Connection for external headset; (3) SEPOS[®] interface and external clock

You can connect the external headset to the *EXT Ton* connection. When the external headset is connected, the internal loudspeaker is automatically turned off.

4.5.1 DATA interface

Via the DATA interface the measurement data is supplied to a digital data logger (Vallon field computer). The needed data transfer cables are optionally available, see table 4.3. Alternatively the VX1 can transmit data wireless via Bluetooth[®].

Table 4.3: Transfer cables for connecting the VX1 with data loggers

Description	Part No.
Transfer cable for connection with VFC2 via serial port	2503170060
Transfer cable for connection with VFC2-N or PC via serial port	2503170020
Transfer cable for connection with PC via USB port (driver installation required)	2503170250

4.5.2 SEPOS® interface

You can connect a SEPOS® detector (optional) via this interface. The measuring values of the VX1 and the data of the SEPOS® detector are transferred to a connected data logger (field computer) and will be correlated during data evaluation.



Information

Connect the detector with the VX1 *before* switching on the VX1. Thus you ensure that the SEPOS®-Detector will be recognised correctly.

4.6 Power supply

The ferrous detector VX1 works with a voltage from 4,0 – 7,5 V. As power supply either standard batteries or rechargeable batteries (accumulators) size D are used, see chapter [Technical data](#) on page 41. Please make sure to use batteries of the same type and the same charging status.

NOTICE

Corroded contact surfaces on batteries can cause errors (e.g. the device switches off spontaneously).

- ▷ Keep the contact surfaces of the batteries free from corrosion (e.g. by cleaning with a fiberglass brush).

NOTICE

Magnetic Batteries can interfere with the magnetometer.

- ▷ If magnetic batteries cause interferences, demagnetize them by using a suitable degaussing device (e.g. Vallon Degaussing Coil EM1005). However, magnetic batteries only occur in exceptional cases.

NOTICE

The battery contacts may be destroyed if battery leakage occurs.

- ▷ Remove discharged batteries immediately. Remove the batteries before storage.

4.6.1 Internal Battery Compartment

Put in the batteries as described in chapter [Setup](#) on page 19.

NOTICE

Permanent penetrating moisture or dust can damage the device.

- ▷ Always keep the battery compartment firmly closed.

4.6.2 External Battery Compartment

The VX1 can be powered by an optional external power supply which is connected to the external battery plug shown in the figure below. When not used, the connection for the external battery compartment is closed by a protective cap.



Fig. 4.6.1: Connection for external battery compartment

NOTICE

Permanent penetrating moisture or dust can damage the device.

- ▷ Always keep the battery compartment firmly closed.

5 Setup

5.1 Setup for surface detection with carrying bar

Step 1

Remove the VX1 of the transport case. If the VX1 is already assembled continue with step 6, else with step 2.



Step 2

Open the connecting nut **(A)** of the probe carrier. Do not remove the connecting nut completely! Lead the probe with the red connector side in front into the probe carrier.



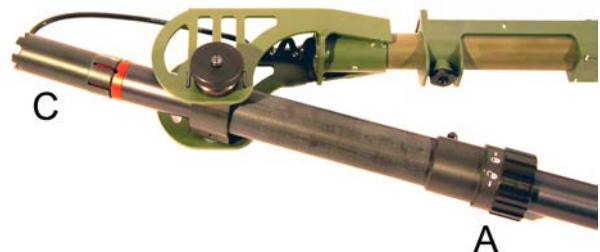
Step 3

Connect the push-pull connector **B** of the carrying bar with the probe (the red marking on the connector must point to the red marking on the probe). The connector has to snap into place. The rubber grommet must be pushed completely onto the connection so that the connection is watertight. Pay attention to cleanliness!



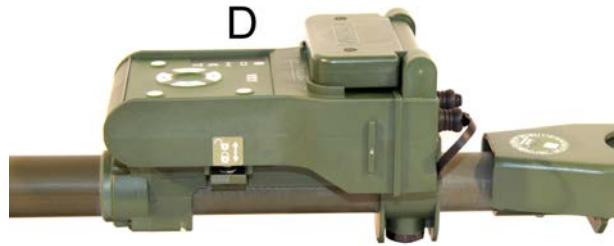
Step 4

Screw on the protective cap **C** of the carrying bar onto the probe. Close the connecting nut **A**.



Step 5

Fasten the control unit **D** on the mount: push the nose of the control unit into the opening on the carrying bar and push it down until it snaps into place.



Step 6

Insert the batteries into the battery compartment **E**.



Step 7

Open the connecting nut **A** of the probe carrier. Shift the probe to adjust it to your body height. Close the connecting nut.

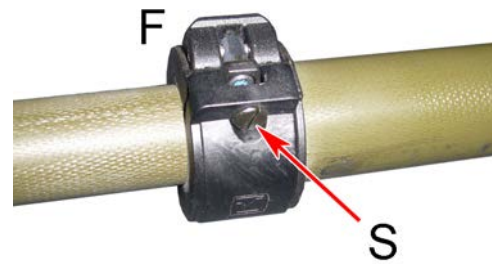


Step 8

Open the latch **F**. Adjust the length of the carrying bar so that the carrying bar is suspended horizontally and in balance with the detector. Close the latch.

If the latch is too firm or too loose, adjust screw **S** correctly with a screwdriver.

Optionally: Put the carrying belt over your shoulder. Hook the carrying belt into the carrying bar.



Step 9

Close the brake **G** to lock the probe in vertical position.



Step 10

To make sure the proper work of the brake (G) and the probe carrier (H), keep them clean.



5.2 Setup for borehole and underwater detection

To assemble the VX1 for borehole detection follow this procedure, see also fig. 5.2.1:

- ▷ Unreel the probe cable to the desired length.
- ▷ Close the reel brake on the backside.
- ▷ Put the cable reel on the ground.
- ▷ Connect the probe with the cable (Push-Pull connector).
- ▷ Insert the batteries into the 2 battery compartments of the cable reel (two batteries in each compartment. Take care of polarity!).
- ▷ Plug the control unit in the connector of the cable reel. It has to snap into place.
- ▷ For detection in water filled boreholes / water: remove the thread protection screw from the probe end. Screw in the additional weight. Screw the thread protection screw into the additional weight (if you need more ballast weight - e.g. in strong currents - you can additionally screw the ring screw into the additional weight and add more ballast weight to it).

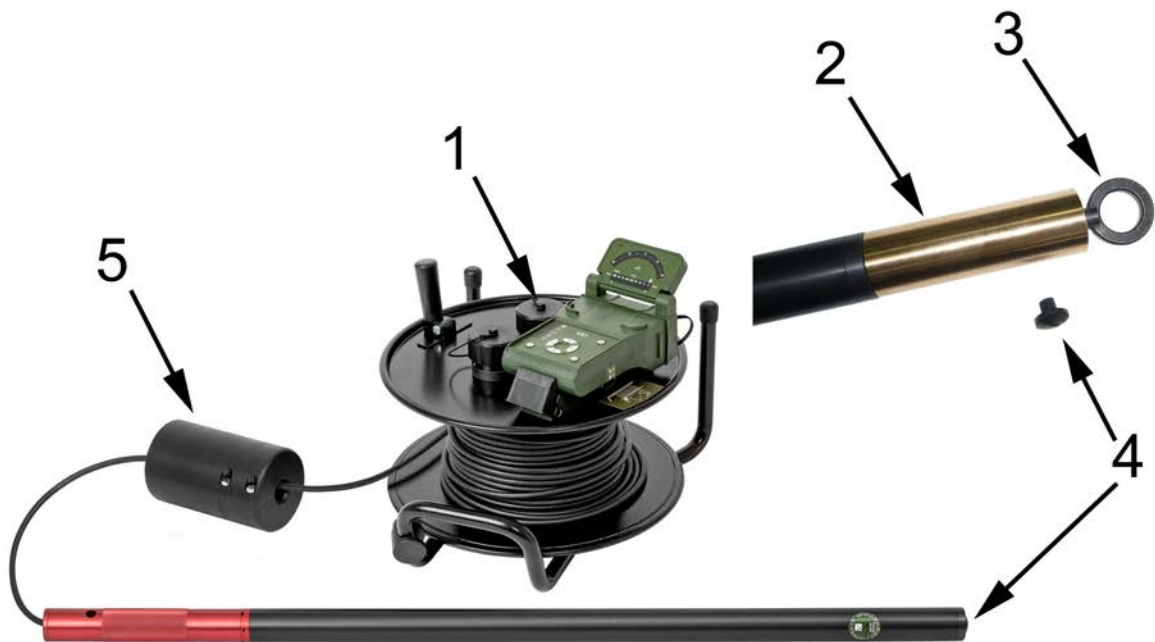


Fig. 5.2.1: Assembly for detection in boreholes/in water: (1) Battery compartments cable reel; (2) Additional weight; (3) Ring screw; (4) Thread protection screw; (5) Cable guard

5.2.1 Cable guard

The cable guard is used to guide the cable into the center of the drill tube so that it is not damaged by the sharp edge of the drill tube. For this purpose, the guard is put over the drill tube, see Fig. 5.2.2.



Fig. 5.2.2: Application of the cable guard

5.3 Unplugging of the probe connector

The probe connector has a lock (metal sleeve under the rubber grommet). To unplug, the plug must be gripped at point **1** so that the lock opens when it is pulled out.



5.4 Selecting the DATA interface

By pressing cursor key UP ▲ twice you will enter the setting menu DATA interface; the function LED *Interface* lights up blue. In the adjustment display the active DATA interface will be shown, see table 5.1. By pressing the cursor keys LEFT ◀ And RIGHT ▶ you can switch between the interfaces. Return to the detection mode by pressing cursor key DOWN ▼ twice. If the Bluetooth® is activated, the function LED *Interface* flashes blue. The selected value is saved when the VX1 is turned off and gets restored when turning on the VX1.

Table 5.1: DATA interfaces

LED in the adjustment display	Meaning	Symbol
20k	RS232 active	IOIOI
200	USB active	
2	Bluetooth® active	

NOTICE

Bluetooth operation increases the energy consumption.
Only activate the Bluetooth interface if you need it.

6 Operation

6.1 Practical considerations

Ferromagnetic metal objects can cause false alarms. Therefore, remove all items which can influence the earth's magnetic field (e.g. shoes with metal parts, cell phones, MP3 players, pocket knives, keys or other metal objects).

6.1.1 Before Detection Work

Bore hole detection or underwater detection: prepare the VX1 according to section [Setup for borehole and underwater detection](#) on page 22.

Manual compensation: according to section [Compensation](#) on page 30. If signal fluctuations occur when moving the probe in the area where the VX1 has been compensated, repeat the compensation in a different location.

Objects near surface: we recommend display scaling ranges 20k, 6k and 2k or the logarithmic setting (before starting work test the sensitivity with items similar to the objects you expect to detect).

Standard search operations: we recommend display scaling ranges (sensitivity) 600, 200, 60 and 20.

Deeply buried objects: we recommend display scaling ranges 6 and 2 (First detect and remove near-surface objects before searching for deeply-buried objects).

6.1.2 During Detection Work

- ▷ Always keep the probe vertical. This ensures comparability of the measuring data even when having changed the direction of walking.
- ▷ Pivoting can cause false alarms. Avoid pivoting the probe during detection work.
- ▷ Always keep a constant distance of the probe to the ground. Try to avoid adjusting this distance to the unevenness of the ground. This ensures comparability of the measuring values.
- ▷ *When working with a data logger and without GPS or SEPOS:* Keep a constant walking speed. This prevents data distortion.

6.2 Switching on the VX1

Ferromagnetic objects can cause false echoes during detection. Therefore, remove all objects that can influence the earth's magnetic field before the search work! This includes footwear with metal components, cell phones, MP3 players, pocket knives, keys, strap buckles and other metallic objects.

While switching on the ferrous locator for borehole detection keep the probe approx. 50 cm above the borehole.

To turn on the VX1 press key ON/OFF for at least 3 seconds. Then the battery status will be shown for 4 seconds and the probe is automatically adjusted (flashing of LED 0 and high-frequency signal tone). The probe adjustment is finished when LED 0 is constantly lit. Now test the correct operation by pressing key TEST. If LED +20 (right) is illuminated, the ferrous locator is operational. If LED +10 (right) is illuminated, an error has occurred. After successful adjustment the current measurement value will be shown.

6.2.1 Probe adjustment and acclimatization

The ferrous locator VX1 is a highly sensitive measuring device. In case of a temperature change it is mandatory for the probe to have enough time to acclimatize. Otherwise a drift of the zero point is likely. In case of major temperature changes it can take up to 60 minutes until the acclimatization is completed.

When switching on the device, the probe is compensated once (this can also be repeated anytime during operation by pressing key COMP). Furthermore, the sensors in the probe are electronically optimized by a special adjustment when switching on the VX1. (Attention: This is NOT done when compensating manually, only when the device is switched on again). This automatic adjustment can shift due to major temperature changes and an associated – possibly initially considerable – drift. It is recommended to perform a restart of the device after the acclimatization so the adjustment can be carried out under the actual adjusted conditions.

6.3 Settings and functions

The function LEDs next to the function keys indicate the parameter that has been selected for adjustment, see fig. 6.3.1.

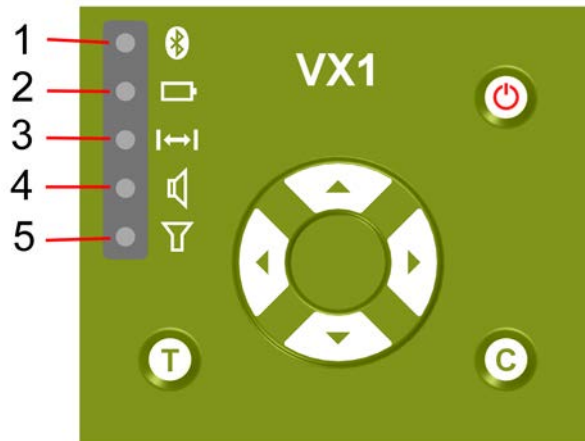


Fig. 6.3.1: Function LEDs: (1) Interface; (2) Battery status; (3) Measuring range (detection mode); (4) Volume; (5) Filter

If no key is pressed for 3 seconds after selecting a parameter for adjustment, the detector automatically returns to the detection mode (LED 3 lights up, adjustment of measuring range active).

6.3.1 Data transfer

The VX1 has interfaces for the data transfer to a field computer (such as VAllon VFC2 or VFC4) or a PC. The data can be transferred via a RS232 interface, a USB interface or wireless via Bluetooth® interface, see section [Selecting the DATA interface](#) on page 24.

To keep power consumption low, only activate Bluetooth® when needed. When you work in the same area with several detectors in Bluetooth® mode, you should keep a distance of at least 5 m between the detectors.

6.3.2 Battery status

The battery status can be checked during operation. When LED 20k is illuminated, the batteries are discharged. The further on the right an LED is illuminated, the further charged the batteries are. When LED 2 is illuminated, the batteries are fully charged.

6.3.3 Measuring range

With this parameter the range of the value scale is defined. The range extends from $\pm 20,000$ nT (for very large measuring values) to ± 2 nT (for very small measuring values). If large measuring values ($\pm 2,000$ nT – $20,000$ nT) are expected (e.g. by doing borehole detection) the ranges ± 20 nT, ± 6 nT and ± 2 nT should not be used because of overdriving effects. When turning on the VX1, the display scaling will be set to ± 200 nT for safety reasons. The sensitivity of the probe is always the same, independent of the adjusted measuring range. The adjustment of the measuring range will be indicated by the adjustment display, see table 6.1.

Table 6.1: Measuring ranges

Measuring range [nT]	LED in the adjustment display
± 20.000	20k
± 6.000	6k
± 2.000	2k
± 600	600
± 200	200
± 60	60
± 20	20
± 6	6
± 2	2

The measuring ranges $\pm 20,000$ nT, ..., $\pm 2,000$ nT are useful for large objects close to the surface. For standard search operations we recommend the measuring ranges ± 600 nT, ..., ± 20 nT. The measuring ranges ± 6 nT und ± 2 nT are only recommended for search operations with sophisticated requirements (e.g. archeological searches). In the measuring ranges $\pm 20,000$ nT, ..., ± 2 nT the scale shows the measuring value in linear mode. In these settings you can determine the nT value directly from the scale.

With a setting outside the measuring ranges ± 20.000 nT (LED 20k), ..., ± 2 nT (LED 2), the scale will show the measuring value in logarithmic mode. The activation of the logarithmic mode is indicated by simultaneous lighting of LED 20k and LED 2. The logarithmic mode covers a wide measuring range (approx. 4 nT – 10,000 nT) and thus it is suitable for simultaneously searching for objects with very large and very small measuring values without changing measuring ranges.

6.3.4 Volume

The volume can be set from 20k (speaker OFF) to 2 (very loud). When turning on the VX1, the volume will be set to 200 for safety reasons, when the previous volume was set to 20k, 6k, 2k or 600.



Information

If no acoustic signal is audible, the volume may be set to minimum.

6.3.5 Filter

To get an optimum between the suppression of disturbance frequencies and data acquisition speed, you can choose two filter settings. When switching on the device, for safety reasons the filter setting with low suppression of disturbance frequencies will be chosen.

LED in the adjustment display	Filter setting	Symbol
20k	High suppression of disturbance frequencies Slow data acquisition speed (approx. 1 – 2 m/s)	
2	Low suppression of disturbance frequencies Fast data acquisition speed (approx. 2 – 3 m/s)	

6.4 Signal evaluation

6.4.1 Acoustic signals

Acoustic signals show device conditions and detection signals in addition to the optical display signals.

Battery Status

During turning on of the VX1 the battery charging status is automatically checked and indicated via acoustic signals.

Battery status	Sound output
Fully charged	approx. 8 pulses per second
Nearly empty	approx. 3 pulses per second

If the battery voltage reaches the lower limit at which the proper operation of the detector is no longer ensured, a dual tone signal is emitted. This signal cannot be turned off. Change the batteries immediately.

Detection

If a detected object causes a deflection of at least ± 5 scale degrees, an acoustic signal is emitted. An increasing deflection is acoustically indicated by an increase in the signal frequency. Depending on polarity and position of the object a deflection to the right or left occurs. A deflection to the right is acoustically indicated by an interrupted signal. A deflection to the left is acoustically indicated by a continuous signal.

Compensation

Immediately after turning on an automatic adjustment is carried out. During this compensation LED 0 is flashing and a high-frequency tone is emitted. If the probe is not plugged-in, this tone is emitted, too.

Test

After pressing key TEST, LED +20 (right) is illuminated when the VX1 is operational. When an error occurs, LED +10 (right) is illuminated. In addition, a low-frequency tone is emitted.

Volume

During volume adjustment a continuous acoustic signal is emitted if the measuring value would cause a deflection smaller than 5 scale degrees.

Device Error

Device errors are indicated acoustically and optically. When a device error occurs, a continuous acoustic signal will be emitted.

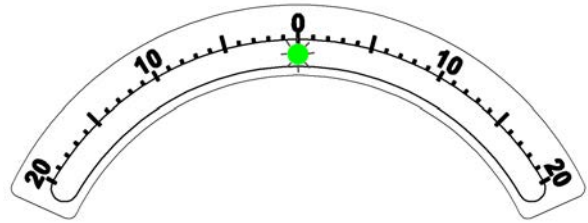
6.4.2 Display signals

The value scale consists of 41 LEDs from LED -20 (left) through LED 0 to LED +20 (right). On the value scale the measuring value and the following device informations are shown:

Display information during normal operation

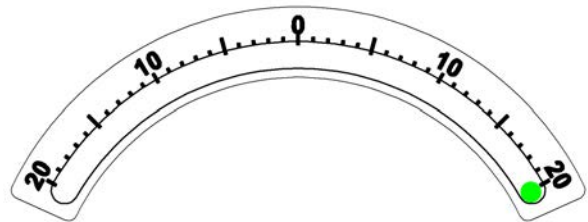
During compensation

- ▷ LED 0 blinks
- ▷ Duration: until compensation has been finished



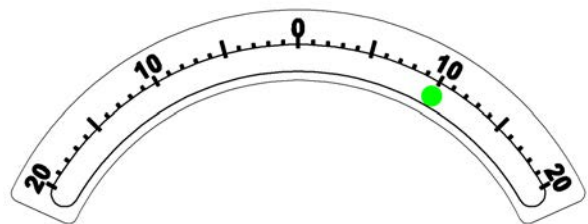
Test carried out successfully (test duration approx. 3 s)

- ▷ LED +20 lights
- ▷ Duration: approx. 3 seconds



Test carried out unsuccessfully (test duration approx. 3 s)

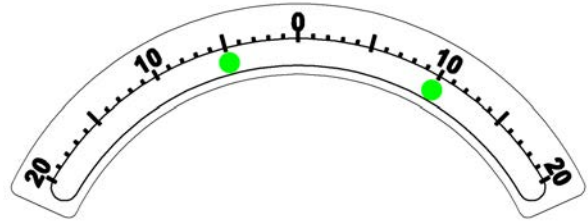
- ▷ LED +10 lights
- ▷ Duration: approx. 3 seconds



Display error information

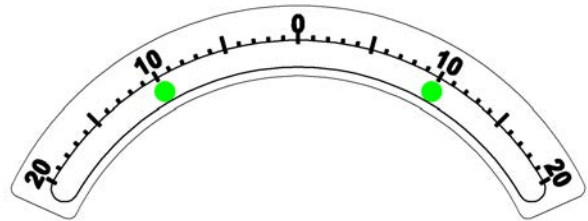
Data transfer to display error, see chapter [Troubleshooting](#) on page 37

- ▷ LED +10 and LED -5 light up
- ▷ Duration: approx. 1 second or until error has been resolved



Electronics error, see chapter [Troubleshooting](#) on page 37

- ▷ LED +10, LED -10 and a LED of the adjustment display light up
- ▷ Duration: approx. 1 second or until error has been resolved



6.4.3 Typical signals during operation

Typical signals during surface operation

The display readings show the influence of the positive and the negative magnetic pole of a ferromagnetic object depending on the location of this object.

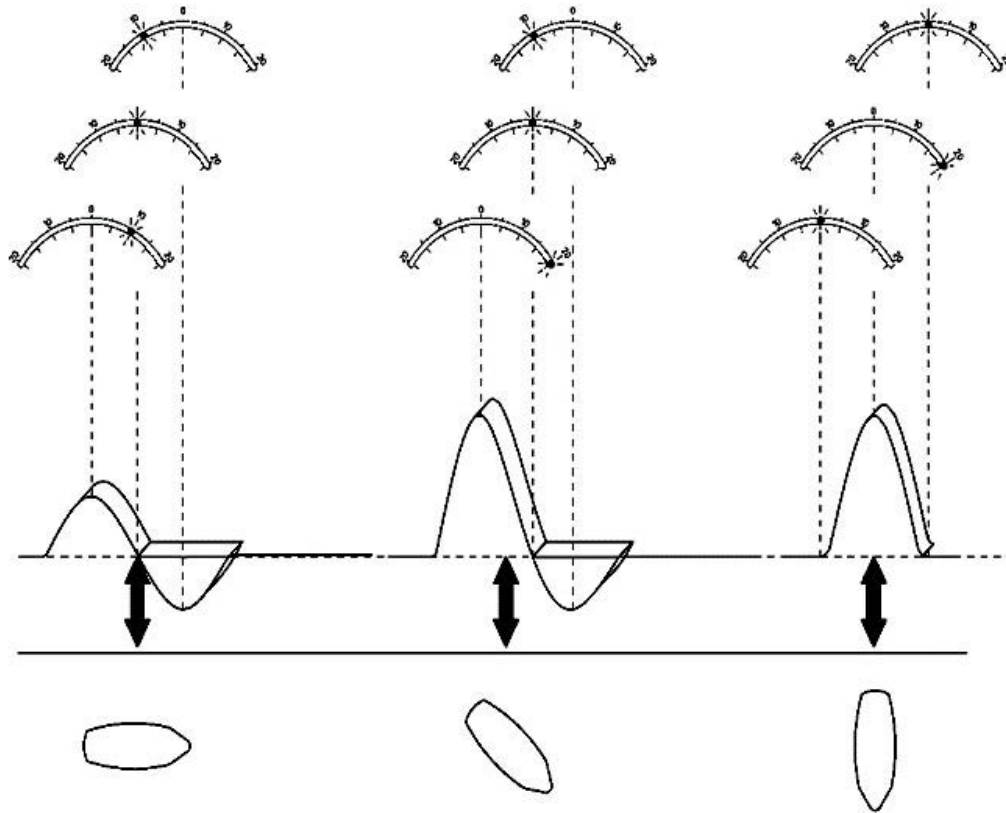


Fig. 6.4.1: Typical display reading during surface detection

Typical signals during borehole operation

The display readings show the influence of the positive and the negative magnetic pole of a ferromagnetic object depending on the location of this object.

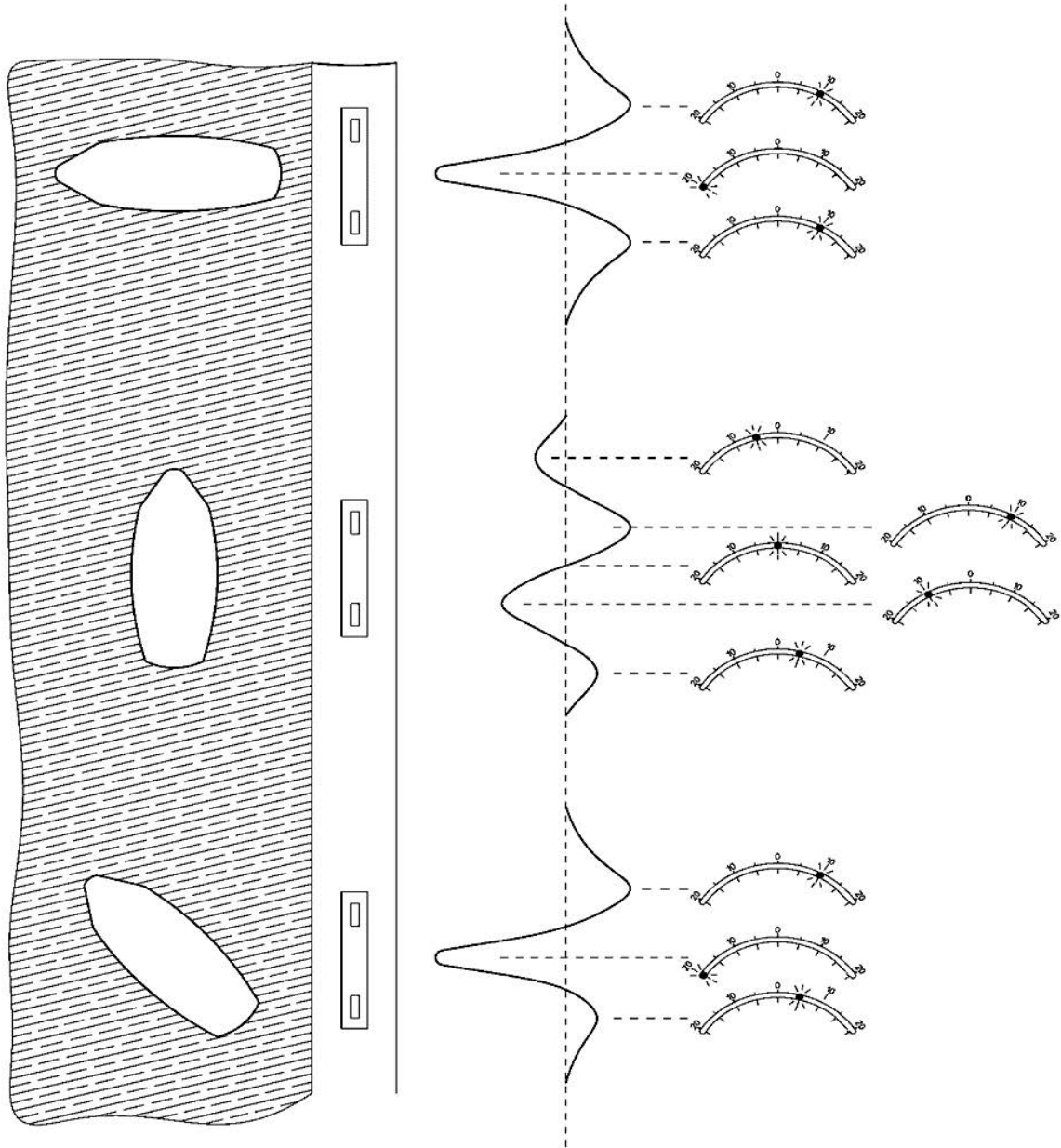


Fig. 6.4.2: Typical display reading during borehole detection

6.5 Determination of object depth using the depth table

1. Place the VX1 directly over the position where the maximum signal has appeared and read measurement value M1
2. Lift probe vertically to the sensor distance of the employed probe (0.5 m for the standard probe VSM) and read measurement value M2
3. Calculate M1/M2 and round the result up
4. Look up M1/M2 in the table and read the depth of the object



Information

- ▷ Carry out both measurements with the same measuring range. If this is not possible, consider the different range when changing the display scaling
- ▷ The values in the depth table are mathematical values which do not indicate the actual achievable search depth
- ▷ The depth table provides a reference on the probable object depth

M1/M2	Object Depth
10.00	0.5 m
4.10	1.0 m
2.80	1.5 m
2.30	2.0 m
2.00	2.5 m
1.80	3.0 m
1.65	3.5 m
1.55	4.0 m
1.50	4.5 m
⋮	⋮

6.6 Computer-aided detection

The ferrous locator VX1 can supply data to Vallon field computers via the DATA interface. Vallon offers field computers which can collect, save, display and export measuring data. The optionally available PC software Vallon EVA can process and evaluate the data with several programme modules for a broad range of tasks. Important for the computer-aided detection is the correct and speed-independent positioning of the data.

Two options are available on request:

6.6.1 SEPOS

The SEPOS system is available for surface detection and borehole detection. SEPOS supplies the detector with its exact position in regular intervals along a walking track or in a borehole. See the operation manual of the Vallon field computer for further information.

6.6.2 GNSS (Global Navigation Satellite System)

You can walk in any direction during detection when acquiring data using a GNSS system. Contact Vallon for purchasing a GNSS system or implementation of already existing GNSS systems.

7 Troubleshooting

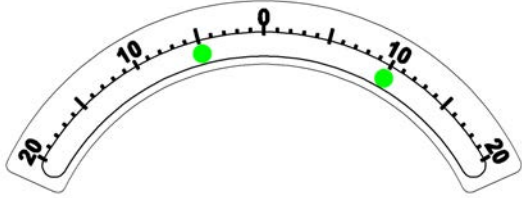
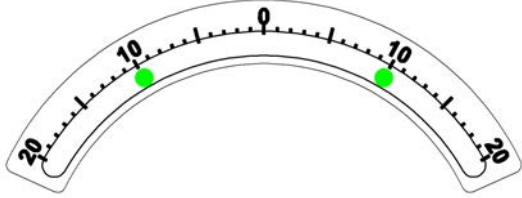
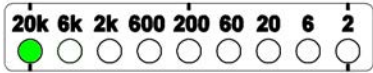
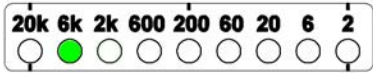
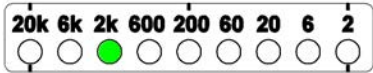
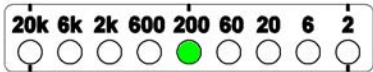
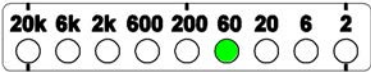
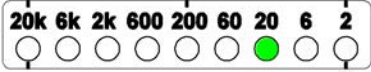
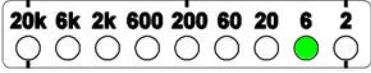
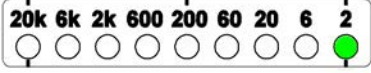
Error message	Cause	Remedy
 <ul style="list-style-type: none"> - LED +10 and LED -5 light - audible signal 	Data transfer to display error	Contact service
 <ul style="list-style-type: none"> - LED +10, LED -10 and one LED of the adjustment display light - audible warning signal 	Electronics error, see table 7.2	

Table 7.2: Electronics error messages

LED adjustment display	Error description	Remedy
	Data transfer error	Connect not more than 3 probes. Detector is defective if error persists
	No probe signal	Check connection detector/probes, carry out compensation at another place
	Power supply low voltage	Charge / replace batteries, clean contact areas of batteries (e.g. with glass fiber brush)
	General display error	Restart detector. Detector is defective if error persists
	Probe checksum mismatch	Restart detector. Detector is defective if error persists

LED adjustment display	Error description	Remedy
	Differing probe states	Restart detector. Detector is defective if error persists
	<i>Not used</i>	
	Probe data transfer error	Restart detector. Detector is defective if error persists
	General probe error	Restart detector. Detector is defective if error persists

NOTICE

Corroded contact surfaces on batteries can cause errors (e.g. the device switches off spontaneously).

- ▷ Keep the contact surfaces of the batteries free from corrosion (e.g. by cleaning with a fiberglass brush).

8 Maintenance and storage

Our detectors do not contain any corroding parts. Aside from charging the batteries, no periodic maintenance work is required.

- ▷ Clean the device after use and check it for visible damage. Use a soft, lint-free cloth or a paper towel for cleaning; slightly moistened with water if necessary. Abrasive cloths or cleaning agents may damage the coating.
- ▷ If necessary, clean plug-in contacts with a hard brush and pure alcohol (e.g. ethanol or isopropanol).
- ▷ If not used for a longer period some types of rechargeable batteries should be stored partly charged. We recommend to charge
 - LiPo batteries to approx. 20 % (± 10 %) of their capacity
 - NiMH batteries to approx. 50 % (± 10 %) of their capacity
 - lead batteries to 100 % of their capacity

Check charge and function of the batteries half-yearly.

NOTICE

Long-term exposure to salt water may cause damage to the device.

- ▷ Rinse the device thoroughly with fresh water after each contact with salt water. For devices with a telescope system, rinse it out by immersing it in fresh water several times.

NOTICE

Long-term exposure to polluted water (contaminated with oil, gasoline or other chemical substances) can damage the device.

- ▷ After each contact with polluted water, clean the device thoroughly with dishwashing detergent and then rinse it carefully with fresh water. For devices with a telescope system, rinse it out by immersing it in fresh water several times.

NOTICE

Using unsuitable cleaning agents for plug-in contacts can impair the function of the device.

- ▷ Do not use cleaning agents that can leave residues or damage the seals of the device (e.g. from automotive technology).

NOTICE

Permanent exposure to moisture may cause damage to the device.

- ▷ Store the detector in dry rooms to particularly protect the plug connections. Only close the hard case if all the internal parts are dry. Replace brittle or damaged seals without delay.

NOTICE

Leaking standard or rechargeable batteries may cause damage to the device.

- ▷ Remove empty batteries from the device. Recharge empty rechargeable batteries immediately. Remove standard / rechargeable batteries from the device prior to storage / transport.

NOTICE

Deep discharge (e.g. due to long-time storage) may cause damage to rechargeable batteries.

- ▷ Avoid deep discharge by charging the batteries frequently.

NOTICE

Very low or high temperatures may cause damage to standard and rechargeable batteries or reduce their performance.

- ▷ Comply with temperatures for use and storage, see chapter [Technical data](#) on page 41.

9 Technical data

Mechanical properties

See also fig. 9.0.1 on page 43.

Property	Value
Probe diameter	32 mm
Sensor distance	500 mm
Probe length	705 mm
IP code of probe	IP68
Transport case dimensions	84 x 30 x 17 cm
Cable reel diameter	30 cm
Weight backpack	0.87 kg
Weight detector (ready for operation)	approx. 3.5 kg
Transport weight detector in hard case	approx. 9.2 kg
Weight cable reel	approx. 6 kg (with 25 m cable and accessories) + 2.4 kg transport case

Tolerances: lengths $\pm 3\%$; weights $\pm 10\%$

Power Supply

Property	Value
Power supply (alternative)	<ul style="list-style-type: none"> ▷ 4 x alkaline batteries size D (LR20) ▷ 4 x rech. NiMH battery size D (HR20)
Battery life LR20*	<ul style="list-style-type: none"> ▷ approx. 100 hours without Bluetooth ▷ approx. 80 hours with Bluetooth

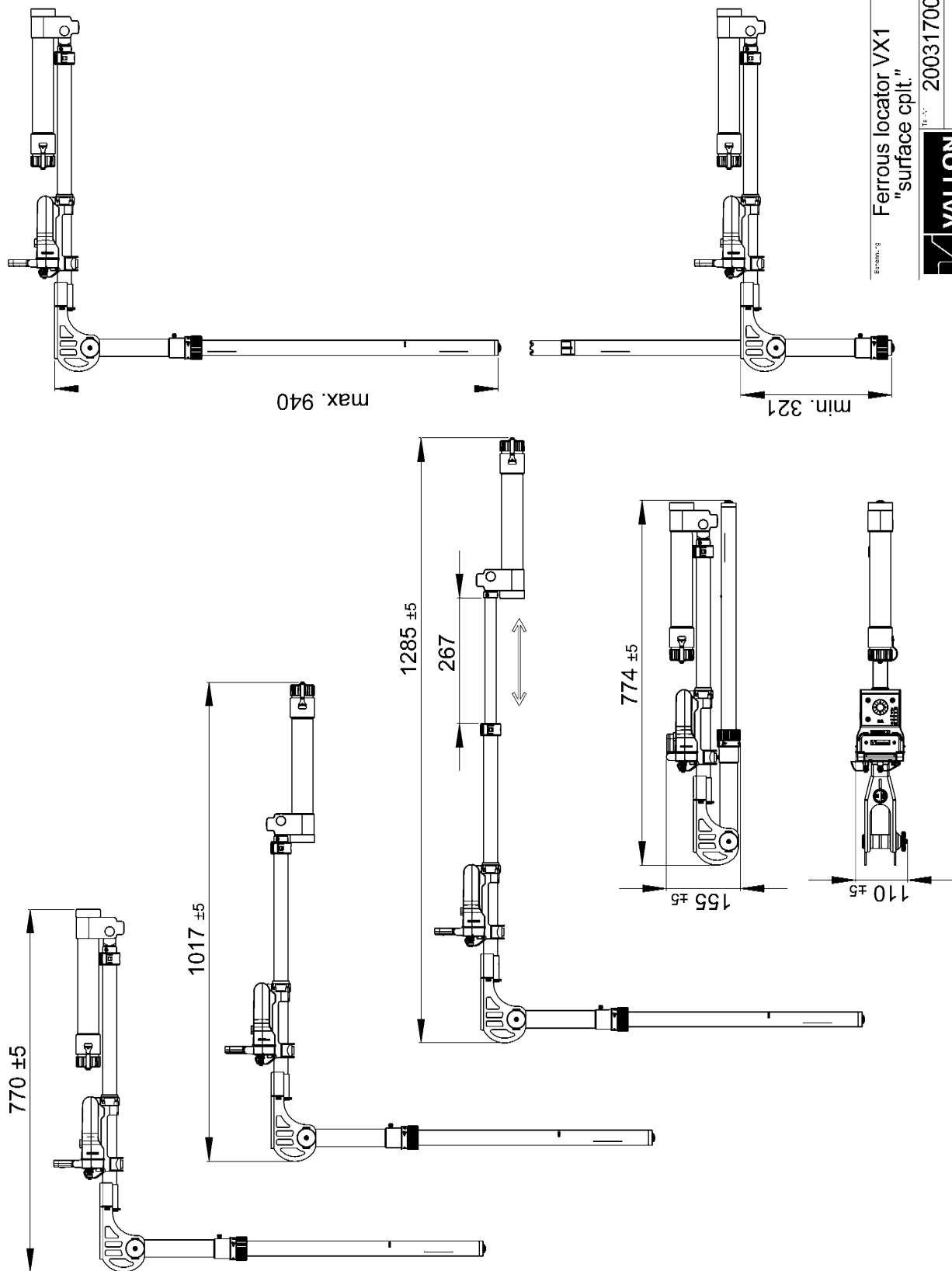
*Environment temp. approx. 20°C, LR20 = Varta Industrial

Operational Conditions

Property	Value
Measuring ranges linear	2 nT, 6 nT, 20 nT, 60 nT, 200 nT, 600 nT, 2000 nT, 6000 nT, 20 000 nT
Measuring range logarithmic	4–10.000 nT
Compensation range VSM VSM4	approx. ± 400 nT asymmetric ± 7.500 nT asymmetric
Signal outputs	RS232, USB, Bluetooth

Storage and Temperature (MIL STD 810G)

Property	Value
Operation temperature	-31°C up to +63°C
Storage temperature (without batteries)	-33°C up to +71°C



10 Legal information

10.1 Patents and third party rights

This product is protected by design patents US D726,128 S and US D712,945 S.

The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. USA. Any use of these marks by Vallon GmbH is under license.

10.2 Warranty

Safe operation of the device is only possible if used as intended and according to the operation manual.

- ▷ Warranty claims will become void if the device is not used in accordance with the intended use.
- ▷ Do not open the device without the written permission of Vallon GmbH. Non-compliance will cause the loss of warranty claims.
- ▷ Due to their limited durability, parts subject to particular wear are excluded from the legal warranty obligation, such as e.g. batteries etc.

10.3 Device disposal

According to Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment, the device shall not be disposed of with unsorted municipal waste. You may return waste equipment free of charge or send them with sufficient postage to our company at the address below:

Vallon GmbH • Arbachtalstr. 10 • 72800 Eningen • Germany

10.4 Battery disposal

The scope of delivery of our products normally includes standard or rechargeable batteries. We are required by law to inform you about the following facts:

Standard and rechargeable batteries contain substances which have harmful effects on the environment and human health. The *European Directive on batteries and accumulators* (2006/66/EC) explicitly prohibits the disposal of batteries and accumulators in household waste. End users are obliged to return spent batteries and accumulators.

Batteries and accumulators must be collected separately from household waste so that they can be recycled or disposed of in an environmentally friendly way. Therefore please hand in your batteries and accumulators at a designated collection point. You may also return standard and rechargeable batteries free of charge or send them with sufficient postage to our company at the address below:

Vallon GmbH • Arbachtalstr. 10 • 72800 Eningen • Germany

Labelling of batteries and accumulators

Standard and rechargeable batteries containing harmful substances are marked with a crossed out dustbin symbol similar to the one in the following figure, as well as by the chemical symbol of the harmful substance: **Cd** for cadmium, **Hg** for mercury, **Li** for lithium, and **Pb** for lead.

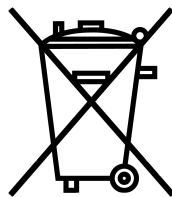


Fig. 10.4.1: The symbol means that standard and rechargeable batteries must not be disposed of in the household waste.

CAUTION

Risk of injury from exploding batteries!

- ▷ Only dispose of completely discharged batteries.
- ▷ Prior to disposal, isolate the contacts of lithium-ion batteries to ensure protection from short circuit.

10.5 EC Declaration of conformity

EC DECLARATION OF CONFORMITY

Vallon GmbH
Arbachtalstr. 10
72800 Eningen
Germany

declares herewith that the device

FERROUS LOCATOR VX1

in conception and construction as well as in the version brought into circulation by us complies to the requirements of the EU directive **2014/30/EU** (26.2.2014) on electromagnetic compatibility. In the event of a change to the device that has not been agreed with us, this declaration loses its validity.

The assessment of the a.m. product with regards to the electromagnetic compatibility is based on the following norms:

DIN EN IEC 61000-6-2:2019
DIN EN IEC 61000-6-4:2019
Class A

In addition, we declare compliance of the device with the EU directive **2011/65/EU RoHS2** (8.11.2011).

Eningen, 11.1.2023



Markus Vallon
Managing Director

Personal notes:

Personal notes:



Vallon GmbH
Arbachtalstr. 10
72800 Eningen, Germany
Tel.: + 49 (0)7121 9855-0
info@vallon.de
www.vallon.de