



Datasheet



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IMPORTANT ADVISORY NOTICE

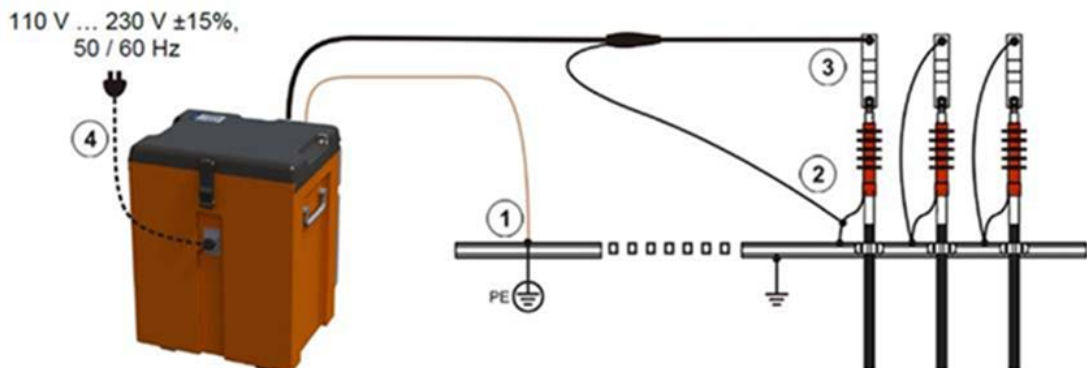
It has recently come to our attention that some users are not connecting the EZ Thump correctly. Safety is paramount and Megger is acting upon this information as a responsible supplier to ensure that it conveys the importance of using this equipment within the guidelines.

The EZ Thump **MUST** be connected as explicitly stated in the User Guide that accompanies the instrument. If the user fails to follow these instructions, a hazard may arise exposing a risk to the user, with subsequent damage to the equipment.

The diagram below is an extract from the User Guide:

The EZ thump has one High Voltage output lead (labelled 3) and two earth return leads. The HV earth return lead (labelled 2) is the measurement lead and must be connected to the test piece and to earth (ground) for safety. The safety earth (labelled 1) is an additional earth return path that must also be connected to ground, close to the user, so that if the HV return is accidentally disconnected this additional safety earth redirects the output current safely through the unit.

Connection diagram The following figure shows the simplified connection diagram:



To ensure correct earth connection between return earth (2) and additional safety earth (1), a measurement must be made using an appropriate ohmmeter. The user can then confirm the resistance between earth connections 1 and 2 is no more than 5 ohms. This information is specified in the User Guide.

In Version 1 EZ Thumps it is also advised to check the safety earth, before connection to the test piece. This is done by measuring between the HV earth return and safety earth return leads (labelled 1 and 2 in the diagram). This value should be 100 ohms +/- 10 ohms. If the measurement is not 100 ohms +/- 10 ohms, please return the unit to your local Megger Authorised Service centre for investigation.

V1 EZ Thumps can be identified by the serial number sticker on the operator plate. Another means of identifying V1 units have their associated leads stored in the back of the unit.

Version 2 EZ Thumps have an additional earth measurement functionality (F-Ohm). This continuously monitors the earth return and automatically disables the test if a reading between measurement and safety earth exceeds 5 ohms. Consequently, the advisory comment above regarding the 100 ohm check does not apply.

V2 units can be identified by the serial number sticker on the operator plate. Another means of identifying V2 units is that the leads are stored in a fabric case on top of the lid, as well as an IEC socket on the front of the unit. V2 units are always grey in colour.

All users must be aware that this instrument outputs high voltage and must only be used by competent, trained engineers. Full operational details are in the user guide which shall always accompany the unit. All safety warnings in the user guide must be adhered to. Megger can provide training on the EZ thump and any other Megger products if required.

If you have any queries on the above, please contact Megger.

EZ-THUMP™ 3 kV & 4 kV, Models V2

Portable Cable Fault Location Systems for Low Voltage Cables



- **Dual-stage capacitor surge discharge: 500 J @ 1.5 kV & 3.0 kV for new 3 kV model**
- **Single-stage capacitor surge discharge: 500 J for 4 kV model**
- **Compact and lightweight, 75 lbs (34 kg)**
- **Battery and AC line operation; field-replaceable battery**
- **Automatic end of cable and distance to fault indication**
- **Up to 94 mA current, depending on voltage**
- **F-OHM safety feature to ensure safe grounding**
- **Interface for remote EMERGENCY OFF box**
- **HiBrite color display for excellent outdoor visibility**
- **TDR prelocation of very low resistance faults**
- **ARM® prelocation of high resistance/flashover faults**
- **Fault pinpointing, high- and low-resistive fault**
- **Sheath testing and sheath fault locating**

DESCRIPTION

The new *dual-stage* 3 kV EZ-Thump is the first of its kind in the entire market, and along with the updated 4 kV single-stage unit they are portable, compact and lightweight, battery and AC line operated cable fault location systems *specifically designed for fault locating of shielded and unshielded low voltage power cables.*

Due to their portable, robust and (wet) outdoor-capable enclosure, they are ideally suited for all typical fault locating operations on LV cables either in industrial applications up to 3 kV or 4 kV, street light fault locating or fault locating of LV power circuits in the utility industry.

The EZT3DV2 model is the only dual-stage 3 kV unit in the market which addresses LV cables with either 600 V or 1000 V ratings and a max permissible test level of 3 U₀ (1.8 kV or 3 kV).

The EZ-Thump units offer:

- TDR method to prelocate very low resistance cable faults.
- Arc Reflection Method (ARM®) prelocation of high resistance/flashover faults.
- *Dual-stage* 500 Joule surge generator for pinpointing of high resistive faults at 0-1.5 kV or 0-3 kV (3 kV model) or as single-stage 500 J 0-4 kV (4 kV model).

- Testing 0-1.5 / 0-3 kV or 0-4 kV for breakdown detection.
- Insulation resistance measurement.
- Sheath testing and sheath fault locating.
- *Dual stage* 0-1.5 kV / 0-3 kV or single-stage 0-4 kV DC testing.

APPLICATIONS

Testing (proof/insulation testing, sheath testing)

Used to test the dielectric strength of the cable or sheath insulation and, if the test fails, to determine the breakdown voltage. For this purpose a test voltage up to 1.5 kV, 3 kV or 4 kV is applied to the cable under test indicating the resistance value.

Fault prelocation

After identifying the type of fault as high resistance/flashover, prelocation of any concentric neutral type LV cable can be determined using ARM. In ARM, the electrical arc from the flashover creates a temporary "jumper" to the neutral. During this condition, a standard TDR measurement is made into what is basically a short circuit fault providing a negative reflection at the location of the fault. Multi-conductor nonshielded LV cables with the *same type of fault* can be typically processed in the same way (phase to phase or phase to neutral).

Faults identified as low resistance/non flashover type in either shielded or unshielded cables can be *prelocated* using the TDR method.

Pinpoint fault location

Accurate pinpoint fault location of high resistance faults is achieved using the "Thunder & Lightning" method whereby the 4 kV single or 3 kV *dual stage* 500 Joule surge generator (thumper) and an acoustic/electromagnetic receiver are used.

Pinpointing of low resistance faults in unshielded cables requires the *additional* ESG NT digital ground/ earth fault locator with or without optional "A" frame. Accurate location of faults is achieved using the voltage gradient method. When approaching the fault, the voltage gradient potential increases, while decreasing with reversed polarity after passing the fault. The change in polarity allows the fault to be located precisely.

FEATURES

- Aside from the expert mode, the quick-step mode combined with the simple E-Tray GUI are especially convenient for operators who do not use the equipment on a regular basis.
- Automatic fault locating procedure starting with a hipot testing, continuing with the prelocation and pinpointing.
- Operating of unit via E-Tray GUI and rotary control knob.
- Automatic end of cable and distance to fault detection.
- Automatic sectionalizing (for specific markets).
- Automatic breakdown detection.
- Safety key switch interlock (also available without).
- F-OHM HV interlock to detect improper grounding.
- Operation from internal battery or from an AC source, or simultaneous charging of battery and AC operation.
- Rugged, lightweight, high impact and weather resistant IP53 designed enclosure.



EZT3DV2 with permanently mounted cart. See configurator on following page, identifier WK.

SPECIFICATIONS

Testing

Output: 0 – 1.5/0 - 3 kV, 94/47 mA DC
0 – 4 kV, 35 mA DC

Prelocation

TDR: Phase to neutral, phase to phase, on screen comparison of up to 256 pairs
Range: 25,000 ft (7.6 km)
Sampling Rate: 100 Mhz
Resolution: 2.5 ft @ 250 ft/fs
0.8 m @ 80 m/μs
Arc Reflection: 0 – 1.5/0 - 3 kV
0 – 4 kV

Pinpoint Fault Location

Surge: 0 - 1.5/3.0 kV @ 500 J
0 - 4 kV @ 500 J
Impulse Sequence: 5 - 10 seconds or single shot

Display

5.7 in. (14.48 cm)
HiBrite TFT Color LCD 640 x 480 pixel

Memory

1000 traces

Interface

USB Port

Cables Supplied

15 ft (4.5 m) HV flexible shielded cable; 50 ft (15 m) optional
15 ft (4.5 m) safety ground cable; 50 ft (15 m) optional
6 ft (1.8 m) AV supply lead set (US/Schuko/UK plug)

Terminations

T1 (typically North America): 14 mm male MC for HV output with matching hotline clamp attachment; HV return and safety ground with hooks and matching hotline clamp attachment.

T2 (typically North America): same as T1, however, hotline clamp attachments for HV output and HV return are replaced by vise grip attachments.

T3 (typically UK): the HV output and HV return leads are terminated with hardwired battery clamps.

T4 (typically all other countries): 10 mm female MC for HV output and HV return with matching battery clamp attachments, safety ground with hook and matching hotline clamp attachments.

Supply

Battery: Internal 24 V NiMH Battery 5 AH Approx.
30 - 60 mins of surge/thumping Approx. 3 hours
recharge time

AC Line: 100 – 230 VAC ±50/60 Hz

Safety

Emergency stop
Key-switch Interlock, standard (available without)
F-OHM interlock detection /indication "proper grounding"
Interface for remote EMERGENCY OFF box

Environmental

Operating Temperature: 4° F to 122° F (-20° C to +50° C)
Storage Temperature: -12° F to 160° F (-25° C to +70° C)

IP Rating

IP53 (with top open)

Weight

71 - 75 lbs (32 - 34 kgs)

Dimensions (include top mounted cable pouch)

14 x 11 x 25 in. (35.5 x 28 x 64 cm)

ORDERING INFORMATION			
MODEL EZT3DV2- MODEL EZT4V2-		YY	ZZ
SELECT CABLE LENGTH	15 ft (4.5 m) Standard cable	15	
	50 ft (15 m) Custom cable	50	
SELECT CABLE TERMINATION	14 mm male MC with hotline clamps (North America)		T1
	14 mm male MC with vise grips (North America)		T2
	2 x hardwired battery clamps (typical UK no alternative termination attachments)		T3
	2 x 10 mm female MC with battery clamps (CEE, ROW & CSA)		T4
* SELECT SOFTWARE OPTION	Sectionalizing software (HDW patent US B 6, 683,459 B2)		S
	Sheath fault testing / secondary fault locating		H
	Manual voltage control		M
**PREP KIT	Hand cart, foldable		C
***PERMANENTLY ATTACHED CART	Provides special permanently attached cart with telescope handle and air tires		WK
DELIVERY WITHOUT SAFETY KEY SWITCH			P
Optional accessories			
15-kV elbow 14 mm female MC connector			865000100100000
25-kV elbow 14 mm female MC connector			865000200100000
35-kV elbow 14 mm female MC connector			865000300100000
DigiPhone Plus surge wave receiver			1003316-S
ESG NT digital earth fault locator			1004629-S
Remote EMERGENCY OFF box with cable			893024147 and 890024896
Hand cart, foldable			895000180110000

NOTE: Prep kit feature C and permanently attached cart feature WK are mutually exclusive.

* Software options can be combined in any way

**Prep kit accommodates either cable lengths of 15 ft (4.5 m) or 50 ft (15 m)

***Permanently attached cart accommodates either cable lengths of 15 ft (4.5 m) or 50 ft (15 m)



The System

The **digiPHONE+** System consists of:

the Receiver

the Sensor

and the Headset





Silence

Careful handling, night work and filtering was yesterday

Today we have a new definition of silence

The innovation in fault pinpointing

Several new, innovative methods of the **digiPHONE+** will ensure the silence



The technology that lets you hear the fault – only the fault!

No traffic!

No high heels!

No talking!

No noise!

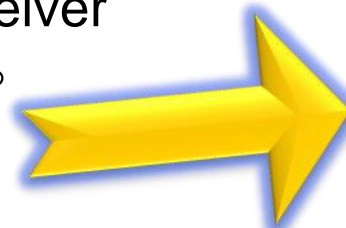
You hear only what you want to hear,

- **- “THE” Fault! Nothing else! Your ears will like it!**



Features

- Highest acoustic quality and external noise immunity
- Automatic Volume Mute with „Bang protection“
- Bright, sun capable display
- Easiest Operation
- Ergonomical, adjustable telescopic handle
- Distance measurement in Milli seconds or meters
- Selectable volume limitation to 84 dB(A)
- Easy tracing with left – right indication
- Fault direction indication
- Automatic adjustment for magnetic and acoustic channel
- Weather proof IP65 Sensor, better IP54 receiver
- High ground stability of the sensor up to 45°
- And...New, high performance connectors!



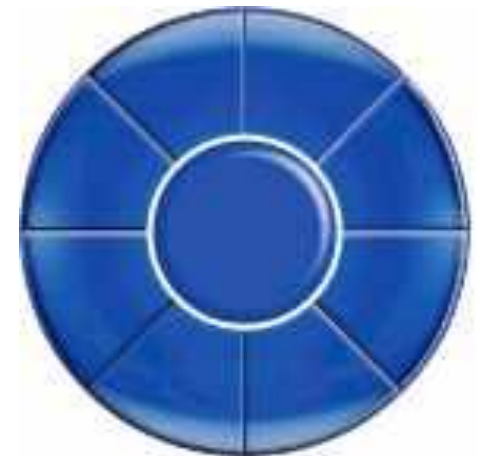
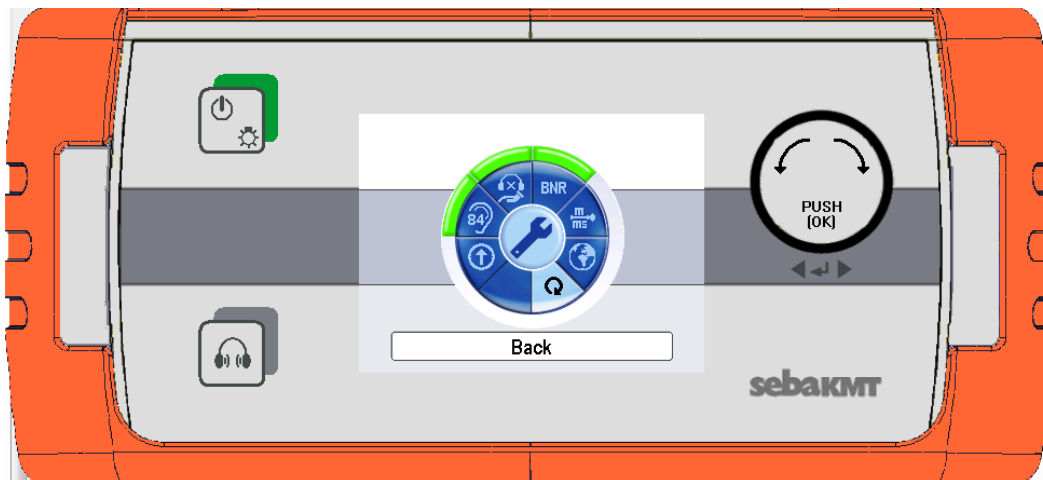


Operation

Like most new Sebakmt systems, the new **digiPHONE+** is operated by the in the centrix approved jogdial philosophy.

The required possible adjustments are limited to the minimum and need in most cases only once to be adjusted.

But even, if the adjustments need to be changed more frequently, the very Straight forward menue stucture supports an easy navigation





Noise and Ear protection

The **digiPHONE+** is a pinpointing device, which is generally based on the detection and evaluation of the noises, that result for the flashover at the fault position.

Resulting several new technologies for sound resp. for the reduction of of sound or noise were used.

BNR – Background Noise Reduction

APM – Auto Proximity Mute

A noise reducing construction of the microphone housing

Adjustable filters

84 dB limiter (according to noise and vibration protection laws)

A completely new, soft suspended sound pickup

An easy detachable handle

Explanations will follow!





Noise reduction

With the new **digiPHONE+**, a new noise reduction technology, the BNR (Background Noise Reduction) was developed

This technology reduces by a specific averaging process the flashover noise to its primary contents.

Disturbing noises disappear and leave an astonishingly clear sound.

The housing itself reduces the body sound significantly by a combination of different composite materials and a free suspension of the microphone

It at all, the noise will come through only very weak





Bang protection, Automatic Mute

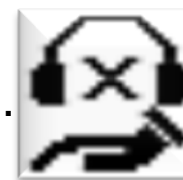
One of the most annoying problems with all ground microphones is the extreme noise during pickup or setting down of the microphone (Bang).

Automatic Proximity Mute - APM.

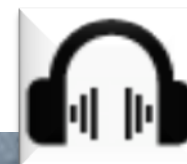
The second silent technology of the new Digiphone+.

Get close to the handle and it turns the volume off. No crack or bang. Just off, before the hand even reaches the handle.

After removing the hand, a short time delay ensures that The Sensor has really settled itself into the new position, and any mechanical oscillations have disappeared, before the sound comes back on.



For uses, that want to control this still by themselves, there is still the alternative Mute key on the front panel **(in the competitive evaluation, the only key beside the power key!)**





Working Safety

Research with the previous Digiphone, but also competitive units showed, That in some cases, due to specific exposure to noise, the risk of a hearing loss exists.

The permitted noise exposure is regulated by different local laws or regulations, for example the „ Occupational Safety and Health Standards” in the USA

1910.95(c)(1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of **85 decibels** measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

When exceeding the permitted 85 db(A) the weekly permitted exposition duration, at least in compliance with the German noise and vibration protection laws, is in the range of only a few minutes!



Working safety

By a selectable limitation of the maximum permissible noise level to 84 db(A), the use can now safely comply With the according limiting regulations



But here it should also be clear, that a permanent wearing of the headset is not essentially required.

In many cases it is absolutely sufficient, to trust the display and to check occasionally or only during the final pinpointing the acoustic response of the fault.



Filter

The audial reception of each uses is subjective and also habitually oriented. The various filter adjustment are also a help to find the setting which suit the specific personal audial reception.

Additionally the selectable filter setting are also comparable with existing sound images as the are typical for specific ground microphones as for example The T 16/841, but also for competitive unists.

Whatever decides the setting of the filters,

- the **digiPHONE+** will guide the user reliably to the fault!





Sensor

Adjustable handle

Exchangeable tips

Active Elektronik – the evaluation happens completely in the sensor!

Housing: Dual shell die casting with telescopic handle

Soft rubber rims for acoustic shielding

Dimensions: Diameter 230mm (at the outer lip)

Height: 140mm

Handle length: 450 ... 750mm

Weight: Sensor mit Teleskopstab ca. 2 kg

Dynamic range: acoustic channel >110dB

Dynamic range: magnetic channel >110dB

Frequency range: 100 ... 1500Hz

4 Filter settings: OFF 100 ... 1500Hz

Low pass 100 ... 400Hz

Band pass 300 ... 500Hz

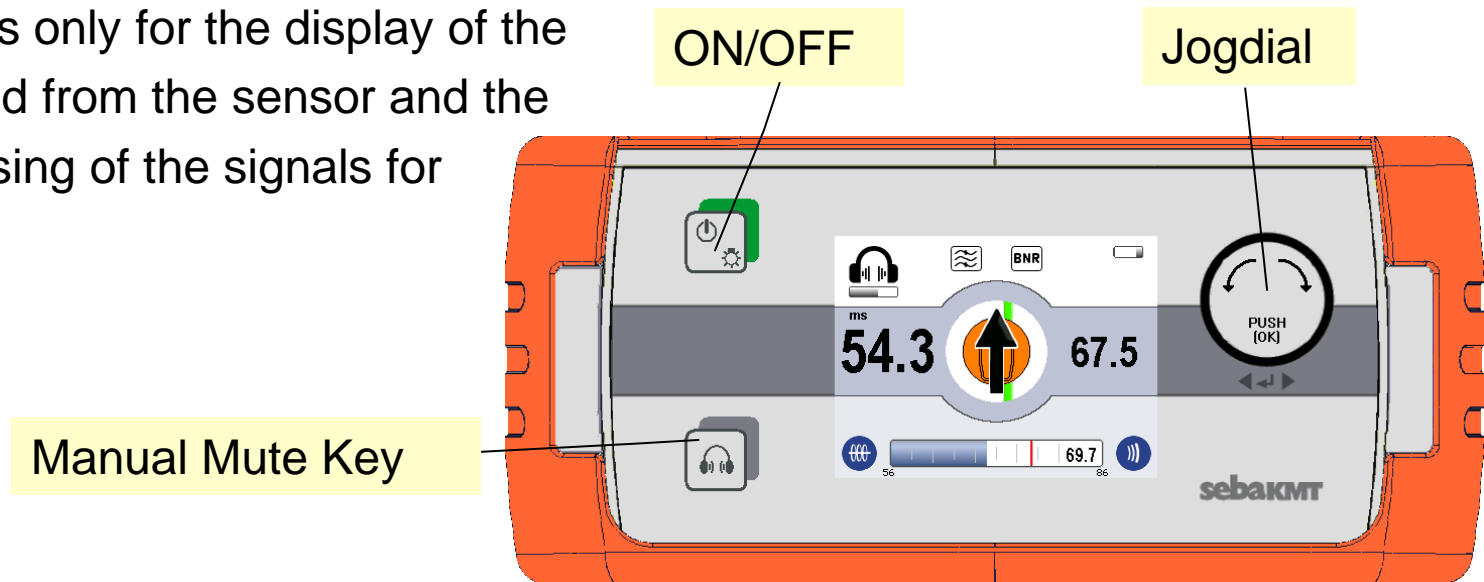
High pass 700 ... 1500Hz





Receiver

The receiver is only for the display of the data generated from the sensor and the signal processing of the signals for the head set.



Dimensions (with rubber frame): 65 mm x 225 mm x 100mm (H x W x D)

Weight: app. 1kg (incl. Batteries)

Supply: 6 pieces Mignon cells Typ IEC R6 (Alkali-Mangan)

Operation time: @ Mignon cells with 2500 mAh capacity: > 10 Std.

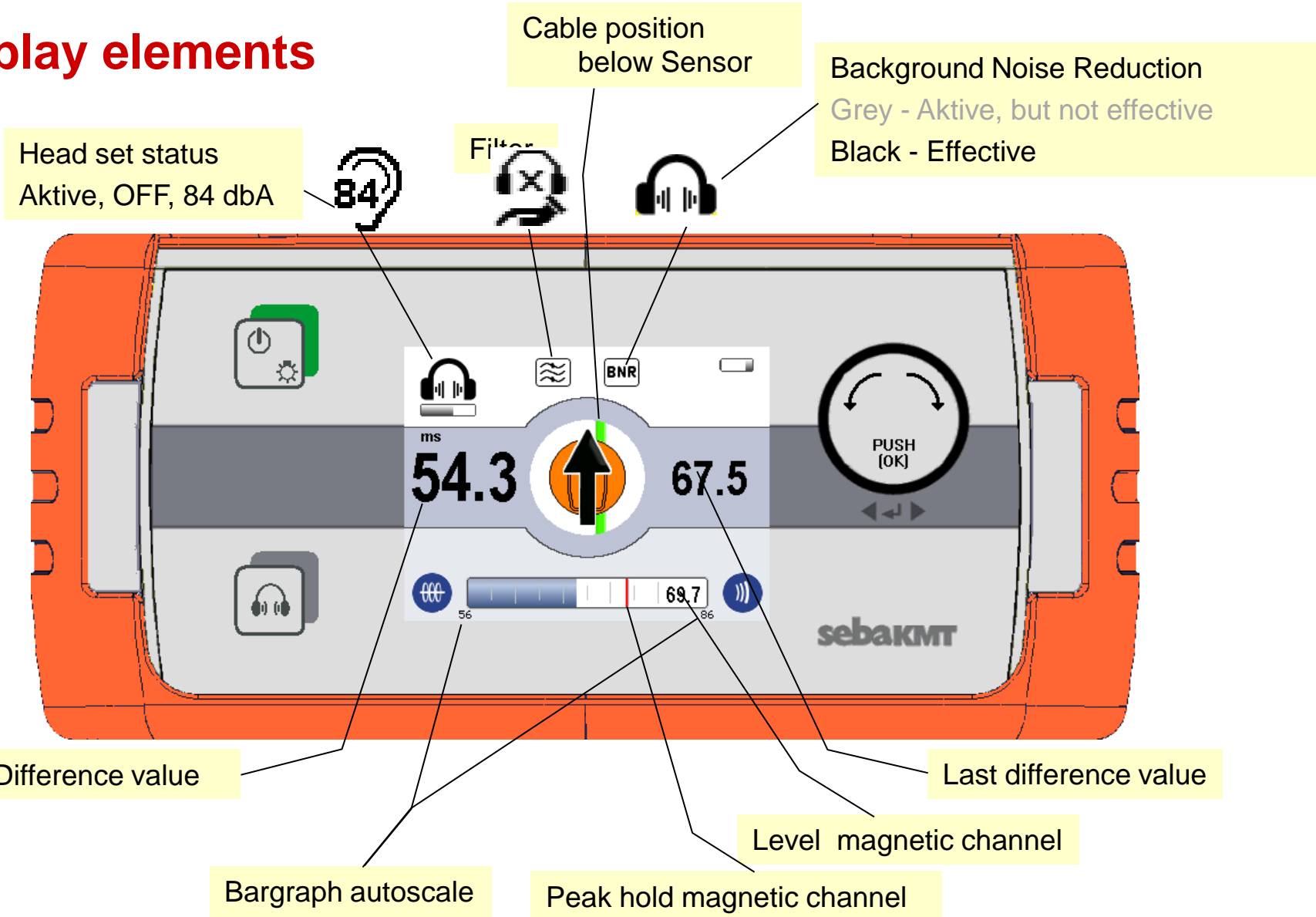
Display: Color TFT - 320x240Pixel

Adjustment: Selectable limitation to 84 dB(A), Volume

Akustic Gain: >120dB



Display elements



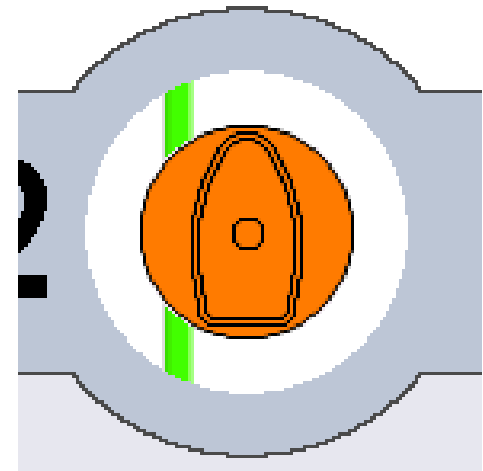
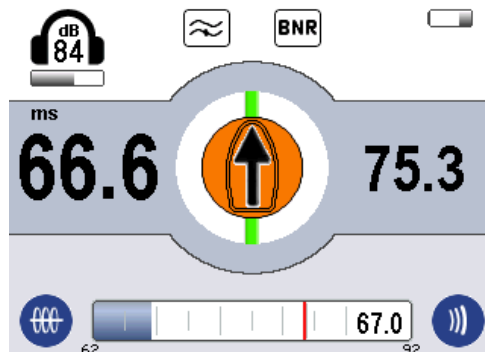


Tracing

A green cable symbol beneath the sensor symbol in the center of the **digiPHONE+** display shows the side position of the sensor in relation to the cable trace.

This ensures automatically, that the user remains with the sensor directly on top of the cable, which makes the fault location more accurate but also easier. Weak faults are much faster detected and located.

A cross measurement is not required, since the system is positioned automatically in the Y-axis on top of the cable





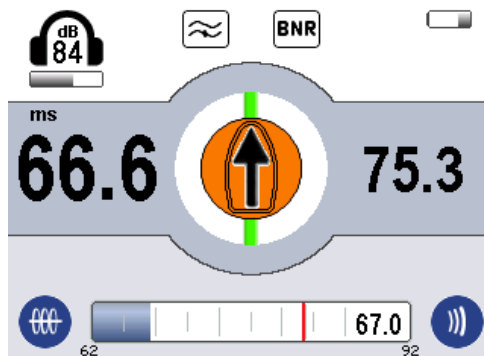
The Compass

The „Compass“ function of the **digiPHONE+** recognises from the data, especially from the difference time measurement, if the user is moving towards the fault. This is indicated by the arrow in the display. The user follows the arrow and approaches automatically the fault position

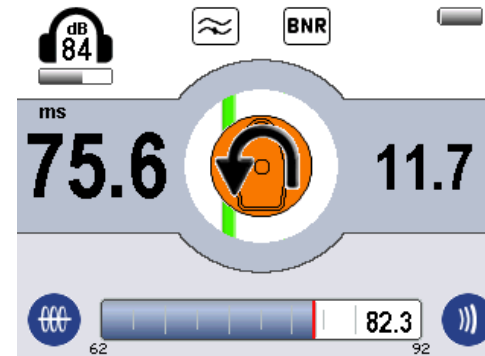


If the **digiPHONE+** detects an increase of the difference time, it means, that the user has passed the fault already. In this case a bent arrow indicates this and requests the user to move backward.

Before the fault:
The new value is lower than the old difference value



After the fault:
The new value is higher than the old difference value





Competiton

The Digiphone (released 1993), as well as its predecessor T 16/8B were the benchmark and handicap for ALL competitors.

Resulting we oriented ourself on these data, but lifted the benchmark in respect to functionality, acoustic, quality and appearance to a new level! The **digiPHONE+** is again the trend setter for the pinpointing which sets And defines clear limits
... The technical data reflect this only limited.

Test it ! Let you customer experience and hear the new **digiPHONE+**

The plain data as in the following comparison table mean very little!

We are supporting you to deliver
a world class service, every day,
in every sector...

LOCATIONS

LONDON, HEATHROW

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