VOLTCRAFT®

DIGITAL MULTIMETER WITH SAT FINDER ST-100

GB OPERATING INSTRUCTIONS

Best.-Nr. / Item no. /
N° de commande / Bestelnr.:
12 34 48

CE

VERSION 09/13

1. INTRODUCTION

Dear customer,

Thank you for making the excellent decision to purchase this Voltcraft® product.

You have acquired a quality product from a brand family which has distinguished itself in the fields of measuring, charging and grid technology thanks to its particular expertise and its continuous innovation.

With **Voltcraft®**, you will be able to handle difficult tasks, either as an ambitious hobbyist or as a professional user. **Voltcraft®** offers reliable technology and a great price-performance-ratio.

We are positive: Starting to work with Voltcraft will also be the beginning of a long, successful relationship.

Enjoy your new **Voltcraft®** product!

2. TABLE OF CONTENTS

GB

3. INTENDED USE

- Measuring and displaying electric parameters in the range of measurement category CAT III (up to 600 V against earth potential, pursuant to EN 61010-1) and all lower categories. Never use it in CAT IV (at a source of low-voltage installations).
- Measurement of direct and alternating voltage up to 600 V
- Measurement resistance values of up to 20 MOhm
- Continuity test (<150 Ohm acoustic)
- Diode test
- Measuring of the satellite reception level at LNBs with 13 - 18 V/DC level switching to set satellite systems.

The device must only be operated with the specified battery type.

The measuring device must not be operated when it is open, i.e. with an open battery compartment or when the battery compartment cover is missing. Measuring in damp rooms or under unfavourable ambient conditions is not permitted.

Unfavourable ambient conditions are:

- Wetness or high air humidity,
- Dust and flammable gases, vapours or solvents,
- Thunderstorms or similar conditions such as strong electrostatic fields, etc.

Any use other than that described above damages the product. Moreover, this is linked to dangers such as short circuit, fire, electric shock, etc. No part of the product must be modified or converted!

Always observe the safety information!

4. DESCRIPTION OF INDIVIDUAL PARTS

See fold-out page

Components of the multimeter

1 Dial switch for setting the measuring functions
2 Display (LCD) with function and measuring unit display
3 The MODE button to switch the measuring functions
4 COM measuring jack (reference potential, minus pole)
5 V/Ω-measuring socket (plus pole)
6 HOLD button for recording the displayed measured value
7 MAX button for automatic recording the peak value
8 Rubber protection frame with rear setup bracket and battery compartment.

Components of the sat finder

9 Level display (0 – 10)
10 F socket for connection cables from the receiver unit (LNB)
11 F socket for connection cables from sat receiver/distributor
12 Dampening controller for satellite signal
13 Safety measuring lines with pluggable CAT III cover caps

Display Information

V/AC	Alternating voltage
V/DC	Direct voltage
V	Volt (unit of electric voltage)
mV	Millivolt (exp.-3)
mA	Milliampere (unit of electrical current, exp.-3)
µA	Microampere (exp.-6)
Ω	Ohm (unit of electric resistance)
kΩ	Kilo Ohm (exp.3)
MΩ	Mega Ohm (exp.6)
HOLD	Measured is recorded
AUTO	Auto-Range = automatic measuring range selection
MAX	Display of the top value
	Symbol for the diode test
	Symbol for the acoustic continuity tester
LNB	Input socket for the receiver cable (LNB)
REC	Output socket for sat receiver
dB	Symbol for signal dampening

Battery change display

5. SAFETY INFORMATION

Please read the operating instructions completely before taking the device into operation. They contain important information for correct operation.

The guarantee/warranty will expire if damage is incurred resulting from non-compliance with the operating instructions! We do not assume any liability for consequential damage!

We do not assume any liability for property damage and personal injury caused by improper use or non-compliance with the safety instructions! In such cases, any warranty/guarantee will expire.

This device left the manufacturer's factory in safe and perfect condition.

To maintain this condition and to ensure safe operation, the user must observe the safety information and warning notes in these operating instructions.

Observe the following symbols:

An exclamation mark in a triangle shows important notes in these operating instructions that must be strictly observed.

The triangle containing a lightning symbol warns against danger of electrical shock or impairment of the electrical safety of the device.

→ The „arrow" symbol indicates that special advice and notes on operation are provided here.

CE This device is CE-compliant and meets the applicable national and international directives.

Protection class 2 (double or reinforced insulation).

Earth potential

CAT II Measuring category II for measurements on electric and electronic devices connected to the mains supply with a mains plug. This category also covers all lower categories (e.g. CAT I for measuring signal and control voltages). Measuring operation is permissible without cover cops at the measuring prods.

CAT III Measuring category III for measuring in building installation (e.g. outlets or subdistribution). This category also covers all lower categories (e.g. CAT II for measuring electronic devices). Measuring operation is only permissible with cover cops at the measuring prods.

For safety and approval reasons (CE), unauthorised conversion and/or modification of the device is not permitted.

Consult an expert when in doubt as to the operation, safety or the connection of the device.

Meters and accessories are not toys and have no place in the hands of children!

At industrial sites, the accident prevention regulations of the association of the industrial workers' societies for electrical equipment and utilities must be followed.

In schools, training centres, computer and self-help workshops, handling of meters must be supervised by trained personnel in a responsible manner.

Ensure before every voltage measurement that the meter is set to a measuring range for current

The voltage between the measuring device and earth potential must not exceed 600 V DC/ AC in CAT III.

When using the measuring lines without cover caps, measurements must not be performed above the measuring category CAT II. When measuring in the measuring category CAT III, the cover caps must be pushed onto the measuring prods to void accidently short circuits during measurement.

Push the cover caps onto the measuring prods until they latch. To remove, pull the caps fro the prods with a little force.

The measuring prods have to be removed from the measured object every time the measuring range is changed.

Be especially careful when dealing with voltages higher than 50 V alternating (AC) or >75 V direct voltage (DC)! Even at these voltages it is possible to receive a potentially fatal electric shock if you touch electrical conductors.

Check the meter and its measuring lines for damage before each measurement. Never carry out any measurements if the protecting insulation is defective (torn, ripped off etc.). The measuring lines have a wear indicator. When damaged, a white insulation layer is visible. The measuring accessories must no longer be used and must be replaced.

To avoid electric shock, make sure not to touch the connections/measuring points to be measured directly or indirectly during measurement. Never reach beyond the noticeable grip area marks at the measuring prods during measurements.

Do not use the multimeter just before, during or just after a thunderstorm (lightning! / high-energy overvoltage!). Make sure that your hands, shoes, clothing, the floor, meter or measuring lines, circuits and circuit components are dry.

Never operate the product in direct proximity of:

- strong magnetic or electromagnetic fields

- Transmitter aerials or HF generators.

This could affect the measurement.

If you have reason to believe that the device can no longer be operated safely, disconnect it immediately and make sure it is not unintentionally operated. It can be assumed that safe operation is no longer possible if:

- the device shows visible damage

- the device no longer functions

- the device was stored under unfavourable conditions over an extended period of time or

- following considerable stress during transportation.

Do not switch the meter on immediately after it was taken from a cold to a warm environment. The condensation that forms might destroy your device. Allow the device to reach room temperature before switching it on.

Do not leave the packaging material lying around carelessly since such materials can become dangerous toys in the hands of children.

Also observe the safety information in each chapter of these instructions.

6. PRODUCT DESCRIPTION

The multimeter (referred to as DMM in the following) indicates measured values on the digital display. The measured value display of the DMM comprises 2000 counts (count = smallest display value).

A rear setup bracket permits a slightly inclined position that facilitates reading of the display in measuring operation.

The individual measuring functions are selected via a dial switch in which the automatic range selection “Auto range” is active. The appropriate measurement range is set individually for each application.

To protect the meter’s batteries, automatic deactivation is active at all times. It switches off the device on its own after approx. 15 minutes.

The integrated Sat finder permits quick setting of satellite systems. The sat meter is dragged into the signal line. The LNB supply takes place via a satellite receiver.

For voltage supply of the multimeter part, two micro batteries (type AAA) are needed (enclosed).

Other additional functions are

• “HOLD” keeps the last measured value in the display

• “MAX” keeps the peak value in the display

The meter can be used for do-it-yourself or for professional applications up to measuring category CAT III.

7. SCOPE OF DELIVERY

Multimeter

1 Set safety measuring lines

2 Micro batteries

Operating instructions

8. COMMISSIONING

Before working with the meter, you have to insert the enclosed batteries.

Insert the batteries as described in the chapter “Cleaning and Maintenance”.

The individual measurement functions can be set via the dial switch. The meter is off when set to “OFF”.

The set finder may be used independently of the dial switch. It is not galvanically connected to the multimeter.

9. MEASURING OPERATION MULTIMETER

Do not exceed the maximum permitted input values. Do not touch any circuits or parts of circuits if they may be subject to voltages higher than 50 V/ACrms or 75 V/DC! Danger to life! Before measuring, check the connected measuring lines for damage such as, for example, cuts, cracks or squeezing. Defective measuring lines must no longer be used! Danger to life!

The multimeter comprises of two independent and galvanically insulated parts. For measuring operation a the mulitmeter part, only the illustrated operating elements are required.

a) Special Functions

The multimeter has special functions that can be used individually during measurements.

HOLD Function

The HOLD function keeps the currently indicated measured value in the displays to allow you to read or record it easily.

To switch on the HOLD function, push the “HOLD” button (6); a signal sound confirms this command and “HOLD” appears on the display.

Push the button “HOLD” (6) again or operate the dial switch (1) to deactivate “HOLD”.

MAX Function

The MAX function keeps the peak value in the displays to allow you to read or record it easily.

To switch on the MAX function, push the “MAX” button (7); a signal sound confirms this command and “MAX” appears on the display.

Push the button “MAX” (7) again or operate the dial switch (1) to deactivate “MAX”.

This function is not available in the measuring range diode test and continuity test.

Automatic Power-Off

In the DMM, automatic deactivation is active at all times to protect the batteries if the device is not used for an extended period. If no button on the meter is pushed or the dial switch moved for about 15 minutes, the DMM signals that it will soon switch off by issuing a signal sound. Push any button or turn the dial switch to reactivate the DMM. If nothing is done, the DMM will switch off.

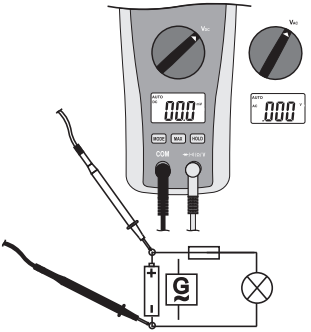
After deactivation, operate the dial switch to activate the DMM again.

b) Direct and Alternating Voltage Measurement

Do not exceed the maximum permitted input values, not even when bearing overlaid direct voltages (e.g. ripple voltages).

Proceed as follows to measure voltages:

- Switch on the DMM at the dial switch (1) and select the measuring range „VDC“ for direct voltage or „VAC“ for alternate voltage. The display shows the „DC or „AC“.
- Insert the measuring lines into the measuring jacks.
- Connect the two measuring prods to the object to be measured (battery, circuit, etc.).
- The measuring value is shown on the display (2).



→ The voltage range „V DC/AC“ has an input resistance of >7.5 MOhm. Once a minus „-“ appears in front of the measured value for direct voltage, the measured voltage is negative (or the measuring lines are swapped). If OL appears, the measuring range was exceeded

c) Resistance Measurement

Make sure that all circuit parts, circuits and components and other objects of measurement are disconnected from the voltage and discharged.

Proceed as follows to measure resistance:

- Switch on the DMM and select the measuring range **"Ω"** . Insert the measuring lines into the measuring jacks.
- Check the measuring lines for continuity by connecting the two measuring prods. The resistance value must be approximately 0.5 Ohm.
- Now connect the two measuring prods to the object to be measured. As long as the object to be measured is not high-resistance or interrupted, the measured value will be indicated on the display (2).
- If „O.L." (overflow) appears on the display, you have exceeded the measuring range or the measuring circuit is interrupted.

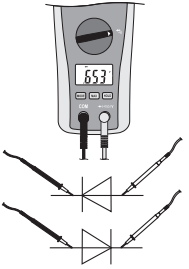
→ If you carry out a resistance measurement, make sure that the measuring points you touch with the measuring prods are free from dirt, oil, solderable lacquer or similar. Such circumstances can falsify the measured result.

d) Diode Test

Make sure that all circuit parts, circuits and components and other objects of measurement are disconnected from the voltage.

Select the measuring range.

- The display shows the diode symbol.
- Check the measuring lines for continuity by connecting the two measuring prods. The value must be approximately 0 V.
- Connect the two measuring prods with the object to be measured (diode).
- The display shows the continuity voltage in V. If „OL“ appears, the diode is measured in reverse direction or the diode is faulty (interruption).



e) Continuity Test

Make sure that all circuit parts, circuits and components and other objects of measurement are disconnected from the voltage.

Select the measuring range

To activate the function of the acoustic continuity tester, push the button “MODE” (3). Pressing this button again takes you back to the diode test, etc.The display shows the icon “Continuity test”.

- A value of approx. < 150 Ohm is recognised as continuity; a beep sounds.
- Once as „OL.“ (for overflow) appears on the display, you have exceeded the measuring range or the measuring circuit is interrupted.

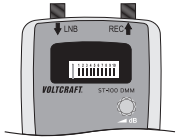
10. MEASURING OPERATION SAT FINDER

To test satellite reception, a sat receiver is required as voltage source and an additional Sat connection cable with F-plugs is needed.

Observe the safety provisions when working in dangerous heights. Use devices for person protection if required.

Also observe individual operating instructions of the satellite receiver system.

The multimeter comprises of two independent and galvanically insulated parts. The sat finder only requires the illustrated operating elements.



The sat finder can quickly and simply set the satellite system to the best reception level. The sat finder is dragged into the reception line between satellite receiver and receiver unit (e.g. LNB) for this.

The display signals the current reception level. The higher the level, the larger the pointer deflection. At high signal levels, the input signal for fine adjustment may be dampened via the dial switch “dB”.

The level display is lit when there is a signal voltage (13 - 18 V/DC).

→ If you are using receiver units with high amplification (>60 dB), you can include an additional dampener with at least 5 dB or use a connection cable of approx. 6 m between the reception unit and sat finder for better fine adjustment.

Connection of the Sat Finder

Ensure that the satellite receiver or distributor is switched off to avoid short circuit when connecting the sat finder.

→ The meter should be connected close to the satellite mirror to set the satellite system depending on the displayed value. Keep enough distance to the satellite system when making the settings. Reception may be negatively influenced by body parts such as head, shoulders or arms.

Set the correct angle (elevation) for the desired satellite at the receiver system. Observe the markings at the setting joints of the receiver unit or its operating instruction.

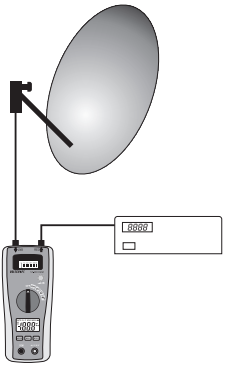
Connect the receiver unit (e.g. LNB) to the “LNC” (10) input at the sat finder with a short sat cable (approx. 1 – 2 m).

The sat cable from the receiver or distributor is connected to the “REC” socket (11).

Switch on the sat system (receiver and poss. sat distributor). The lighting in the scale display of the sat finder must be lit with the signal voltage present.

Turn the receiver system sideways to the approximate area (Azimut) of the desired satellite with a compass.

Turn the dampening controller (12) clockwise or counterclockwise until the scale pointer is set to approx. “5”.



Adjust the receiver unit in one direction and observe the pointer deflection of the sat finder. If it reduces, change the rotating direction of the receiver unit.

If the pointer is at the end section, dampen the signal by turning the dampening controller (12) to approx. display “5”. A turn counter-clockwise reduces sensitivity. A turn clockwise increases sensitivity.

➔ Try changing the feed horn position (forward/back) and polarisation (angle of the receiver in the holder) to increase the pointer deflection as well.

Repeat this procedure until no signal improvement is possible anymore. Attach all setting screws of the receiver system reliably.

After successful setting, switch off the entire system, remove the connection cable and the sat finder and connect the cable from the satellite receiver to the receiver unit. When connecting the cables, ensure sufficient weather and moisture protection. Ingressing water oxidises the contacts, which may cause system failure sooner or later!

11. MAINTENANCE AND CLEANING

a) General Information

To ensure accuracy of the multimeter over an extended period of time, it should be calibrated once a year.

Notes on replacing the battery are provided below.

Regularly check the technical safety of the device and measuring lines, e.g. check for damage to the casing or squeezing, etc.

b) Cleaning

Always observe the following safety information before cleaning the device:

Live components may be exposed if covers are opened or parts are removed (unless this can be done without tools).

The connected lines must be disconnected from all measuring objects before the device is cleaned or repaired.

Do not use any carbon-containing cleaning agents or petrol, alcohol or the like to clean the product. They will damage the surface of the meter. Furthermore, the fumes are hazardous to your health and explosive. Also do not use any sharp-edged tools, screwdrivers, metal brushes, etc. for cleaning.

Use a clean, lint-free, antistatic, dry cloth for cleaning the device or the display and the measuring lines.

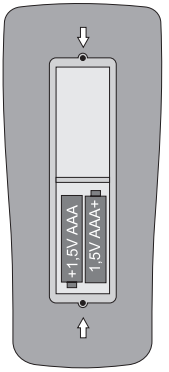
c) Inserting and Changing the Batteries

The multimeter is operated with two micro batteries (AAA). You need to insert new, charged batteries before initial operation or when the battery change symbol appears on the display.

The sat finder needs no batteries and is supplied via a satellite receiver/distributor.

Proceed as follows to insert or change the batteries:

- Disconnect your meter from the measuring circuit and switch it off.
- Remove the rubber protection frame from the device.
- Loosen the screws of the battery compartment lid (8) and pull it off of the device.
- Carefully insert new batteries into the compartment in the correct polarity
- Close the casing carefully again.



Never operate the meter when it is open. !DANGER TO LIFE!

Do not leave flat batteries in the meter. Even batteries protected against leaking can corrode and thus release chemicals which may be detrimental to your health or destroy the battery compartment.

→ You can order suitable alkaline batteries stating the following order no.: order no. 65 23 03 (please order two).

Only use alkaline batteries, as they are powerful and have a long service life.

12. DISPOSAL

Old electronic devices are recyclable and should not be disposed of in the household waste. At the end of its service life, dispose of the product at the community collection point according to the relevant statutory regulations. It is prohibited to dispose of the device in the household waste.

Disposal of Used Batteries!

You as the end user are required by law (Battery Ordinance) to return all used batteries/rechargeable batteries. Disposing of them in the household waste is prohibited!

Batteries/rechargeable batteries containing toxic substances are marked with the symbols shown, which indicate they cannot be disposed of in the household waste. The descriptions for the respective heavy metals are: Cd = cadmium, Hg = mercury, Pb = lead. You may return used batteries/rechargeable batteries free of charge at the official collection points of your community, in our stores, or wherever batteries/rechargeable batteries are sold!

You thus fulfil the legal requirements and make your contribution to protecting the environment!

13. TROUBLESHOOTING

In purchasing the DMM, you have acquired a product designed to the state of the art and operationally reliable.

Nevertheless, problems or errors may occur.

For this reason, the following is a description of how you can easily remove possible malfunctions yourself:

Always observe the safety information!

Error	Possible cause
The multimeter does not work.	Are the batteries dead? Check the status.
No measured value change.	Is the HOLD function activated?
The scale display of the sat finder is not lit.	The sat system is not switched on. The cables are not connected correctly. DC-uncouple connection sockets were used

Repairs other than those described above must only be carried out by an authorised specialist.

If you have any questions about handling the meter, our technical support is available under the following telephone number:

Voltcraft®, 92242 Hirschau, Lindenweg 15,
phone no. (+49) (0) 96 04 / 40 87 80

14. TECHNICAL DATA

Display.....2000 counts

Auto-Power OFF.....after approx. 15 minutes, a signal sounds; deactivation takes place after another minute.

Input resistance.....>7.5 MΩ

Measuring type.....Average measurement

Operating voltage.....DMM: 3 V/DC (2 x AAA)
Sat-Finder: 13 - 18 V/DC

Operating altitude.....Max. 2000 m above sea level

Degree of contamination.....2

Working temperature.....0°C to +40°C

Storage temperature.....-10°C to +50°C

Weight.....Approx. 308 g

Dimensions (LxWxH).....162 x 75 x 44 (mm)

DMM measurement tolerances

Statement of accuracy in ± (% of reading + display error in counts (= number of smallest indicated point)). The accuracy is valid for one year at a temperature of +23°C ± 5°C, and at a relative humidity of less than 75 %, non-condensing.

Direct voltage range, overload protection 600 V

Range	Accuracy	Resolution
200 mV	±(0,5% + 3)	0,1 mV
2 V	±(1% + 3)	1 mV
20 V		10 mV
200 V		100 mV
600 V		1 V

Alternate voltage range, overload protection 600 V

Area (50-60 Hz)	Accuracy	Resolution
2 V	±(1% + 5)	1 mV
20 V		10 mV
200 V	±(1,5% + 10)	100 mV
600 V		1 V

Resistance range

Range	Accuracy	Resolution
200 Ω	±(0,8% + 5)	0.1 Ω
2 kΩ	±(1,2% + 3)	1 Ω
20 kΩ		10 Ω
200 kΩ		100 Ω
2 MΩ	±(2% + 5)	1 kΩ
20 MΩ	±(5% + 8)	10 kΩ

Acoustic Continuity tester <150 Ω

Diode test voltage 1.5V/DC; test current: max. 1 mA

Sat-Finder

Frequency range	950 MHz to 2.3 GHz
Sensitivity	Scale value approx. 7 (at LNB amplification 55 dB)
Scale display	0 - 10
Operational range	LNB-amplification max. 60 dB*

*from 60 dB onwards, a dampener with at least 5 dB is needed.

Do not exceed the maximum permitted input values. Do not touch any circuits or parts of circuits if they may be subject to voltages higher than 50 V/ACrms or 75 V/DC! Danger to life!