

# ENGLISH

## User manual




CE

**Table of Contents:**

1. SAFETY PRECAUTIONS AND PROCEDURES .....	2
1.1. Preliminary.....	2
1.2. During use .....	3
1.3. After use .....	3
2. GENERAL DESCRIPTION .....	4
3. PREPARATION FOR USE .....	4
3.1. Initial .....	4
3.2. Supply Voltage .....	4
3.3. Calibration .....	4
3.4. Storage.....	4
4. OPERATING INSTRUCTIONS.....	5
4.1. Instrument Description.....	5
4.2. FUNCTION Keys description.....	6
4.2.1. POWER key .....	6
4.2.2. INPUT/OUTPUT key .....	6
4.2.3. V/mV key.....	6
4.2.4. mA/% key .....	6
4.2.5. ▲ and ▼ arrow keys.....	6
4.2.6. Deactivation of the Auto power off function.....	6
4.3. Functions description.....	7
4.3.1. DC Voltage measurement.....	7
4.3.2. DC Voltage generation.....	8
4.3.3. DC current measurement.....	9
4.3.4. DC current generation.....	10
4.3.5. Loop current measurement of external transducers .....	11
4.3.6. Simulating of a transducer .....	12
5. MAINTENANCE.....	13
5.1. General Information.....	13
5.2. Battery Replacement .....	13
5.3. Fuses Replacement.....	13
5.4. Cleaning .....	13
5.5. End of life .....	13
6. TECHNICAL SPECIFICATIONS.....	14
6.1. Technical Features .....	14
6.1.1. Reference standards.....	14
6.1.2. General data .....	14
6.2. Environment .....	14
6.2.1. Environmental conditions .....	14
6.3. Accessories .....	14
7. SERVICE .....	15
7.1. Warranty Conditions .....	15
7.2. Service .....	15

## 1. SAFETY PRECAUTIONS AND PROCEDURES

This instrument complies with safety Standard IEC/EN61010-1 related to electronic measuring instruments. For your own safety and to avoid damaging the instrument follow the procedures described in this instruction manual and read carefully all notes preceded by this symbol .

When taking measurements:

- Avoid doing that in humid or wet places.
- Avoid doing that in rooms where explosive gas, combustible gas, steam or excessive dust is present.
- Keep you insulated from the object under test.
- Do not touch exposed metal parts such as test lead ends, sockets, fixing objects, circuits etc.
- Avoid doing that if you notice anomalous conditions such as breakages, deformations, fractures, leakages of battery liquid, blind display etc.
- **Do not apply a voltage exceeding 30V** between any couple of inputs or between each input and the ground reference to avoid risks of electrical shocks and/or damage to the instrument

The following symbols are used in user manual and on the meter:



CAUTION - refer to the instruction manual - an improper use may damage the instrument or its components



Danger high voltage: risk of electric shocks



Double insulated meter



Ground reference

### 1.1. PRELIMINARY

- This instrument has been designed for use in environments of pollution degree 2
- It can be used for **DC VOLTAGE** and **DC CURRENT** measurements up to 10V and 24mA respectively
- When using the instrument always respect the usual safety regulations aimed at protecting you against the dangerous electric currents and protecting the instrument against incorrect operations
- Only the leads supplied with the instrument guarantee compliance with the safety standards in force. They must be in good conditions and, if necessary, replaced with identical ones
- Do not test or connect to any circuit exceeding the specified overload protection
- Do not effect measurements under environmental conditions exceeding the limits indicated in § 6.2.1
- Make sure that batteries are properly installed.
- Before connecting the test leads to the installation check the corrected mode function to avoid any damage to the instrument

## 1.2. DURING USE

Read the recommendations which follow and the instructions in this manual:



### CAUTION

An improper use may damage the instrument and/or its components or injure the operator.

- Before the selection of a function, first disconnect the test leads from the circuit under test
- When the instrument is connected to measuring circuits never touch any unused terminal
- **Do not apply a voltage exceeding 30V** between any couple of inputs or between each input and the ground reference to avoid risks of electrical shocks and/or damage to the instrument

## 1.3. AFTER USE

- After using the instrument turn it off.
- If you expect not to use the instrument for a long period remove the battery to avoid leakages of battery liquids which may damage its inner components.

## 2. GENERAL DESCRIPTION

This instrument, process calibrator HT8000, performs the following measurements:

- Generation of output voltage signal with amplitude up to 10VDC
- Voltage measurement up to 10VDC
- Generation of output current signal with amplitude up to 24mADC
- Current measurement up to 24mAVDC
- Current measurement in percentage format (0-24mA)
- Loop current measurement of external transducers
- Simulating of a external transducer

Function keys are available on the front side of the meter (see § 4.2) for the selection of the possible operations. The selected quantity is displayed with indication of measuring unit and active functions.

## 3. PREPARATION FOR USE

### 3.1. INITIAL

This instrument was checked both mechanically and electrically prior to shipment. All possible cares and precautions were taken to let you receive the instrument in perfect conditions.

Notwithstanding we suggest you to check it rapidly (eventual damages may have occurred during transport – if so please contact the local distributor from whom you bought the item).

Make sure that all standard accessories mentioned in § 6.3 are included.

Should you have to return back the instrument for any reason please follow the instructions mentioned in § 7.

### 3.2. SUPPLY VOLTAGE

The instrument is powered by batteries mod. 9V NEDA1604, 006P, IEC6F22 included in the packaging. When batteries are low the symbol "⊖+" is displayed. To replace/insert batteries follow the instructions indicated in § 5.2.

### 3.3. CALIBRATION

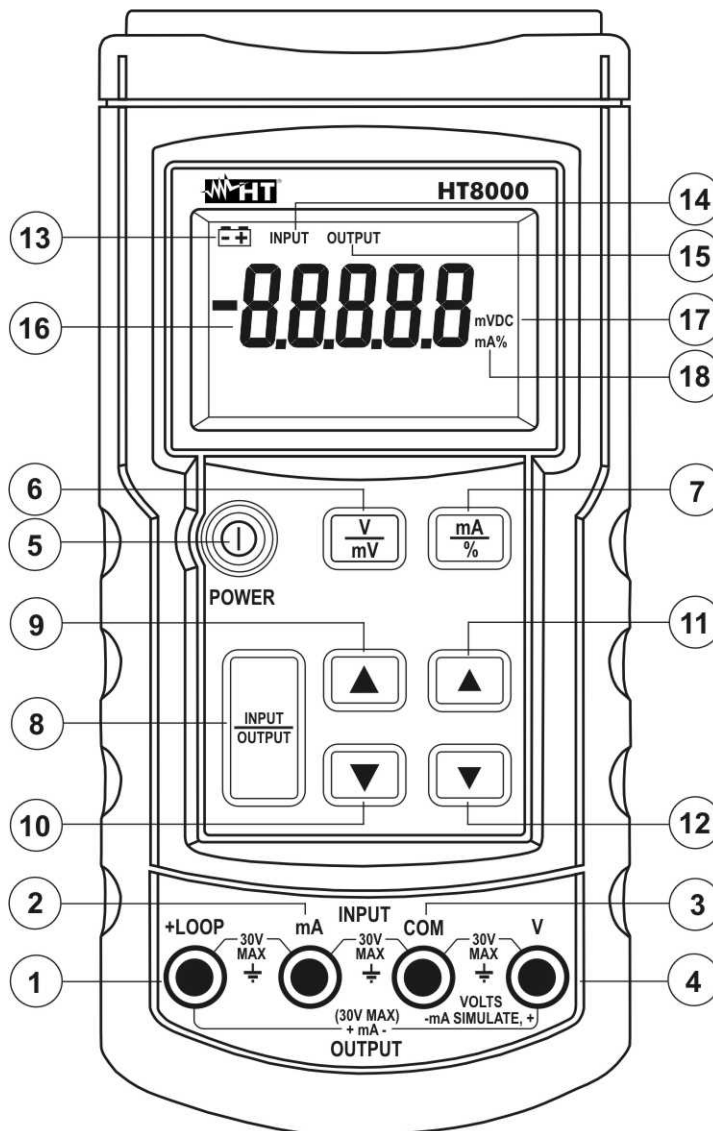
The instrument complies with the technical specifications contained in this manual and such compliance is guaranteed for 12 months.

### 3.4. STORAGE

After a period of storage in extreme environmental conditions exceeding the limits mentioned in § 6.2.1 let the instrument resume normal operating conditions before using it.

## 4. OPERATING INSTRUCTIONS

### 4.1. INSTRUMENT DESCRIPTION



#### LEGEND:

1. **+LOOP** jack
2. **mA** jack
3. **COM** jack
4. **V** jack
5. **POWER** key
6. **V/mV** key
7. **mA/%** key
8. **INPUT/OUTPUT** key
9. **▲** Arrow key for increase most significant digits
10. **▼** Arrow key for decrease most significant digits
11. **▲** Arrow key for increase decimal digits
12. **▼** Arrow key for decrease decimal digits
13. Low battery indication
14. "INPUT" mode indication
15. "OUTPUT" mode indication
16. LCD display
17. Voltage measurement unit
18. Current measurement unit

Fig. 1: Instrument description

## 4.2. FUNCTION KEYS DESCRIPTION

### 4.2.1. POWER key

Press the **POWER** key for switch on/off the instrument. The reference of the last selected function is displayed.

### 4.2.2. INPUT/OUTPUT key

Press the **INPUT/OUTPUT** key to select the mode of the measurement of the parameters (INPUT) and the generation of signals (OUTPUT) performed by the instrument. The "INPUT" or "OUTPUT" symbols are displayed.



### CAUTION

The instrument **DO NOT** perform the simultaneous operations of measurements (INPUT) and signals generation (OUTPUT)

### 4.2.3. V/mV key

By means of this key is possible to select the measurement unit "mV" (100mV range) or "V" (10V range) of DC voltage both for measurement (INPUT) and generation (OUTPUT) operations

### 4.2.4. mA/% key

By means of this key is possible to select the measurement unit "mA" (24mA range) or "mA%" relative to the 0-24mA scale (-25% → 0mA, 0% → 4mA, 100% → 20mA, 125% → 24mA) of DC current both for measurement (INPUT) and generation (OUTPUT) operations.

### 4.2.5. ▲ and ▼ arrow keys

The ▲ and ▼ arrow keys, associated to each DC voltage and DC current generation, permits respectively to increase or decrease the value set at display. The arrow keys in the positions 9 and 10 of Fig. 1 permits to increase or decrease the value of the most significant digits while the arrow keys in the positions 11 and 12 of Fig. 1 permits to increase or decrease the value of the less significant digits in order to perform a fine adjust of the value set at display. Press and hold of this keys to perform a fast set values operation.

### 4.2.6. Deactivation of the Auto power off function

In order to preserve internal battery the instrument switches automatically off approx. 6 minutes after it was last used. When the instrument must be used for long periods of time, it may be useful to deactivate the Auto Power Off function as follows:

1. Switch off the instrument
2. Keeping the **INPUT/OUTPUT** key pressed switch on the instrument by pressing the **POWER** key. The symbol "**APOno**" appears at display for a while
3. Switch off and on again the instrument to automatically enable the function.

### 4.3. FUNCTIONS DESCRIPTION

#### 4.3.1. DC Voltage measurement



#### CAUTION

Maximum input for DC voltage is 30V. Do not attempt to take any voltage measurement that exceeds the limits. Exceeding the limits could cause electrical shock and damage the multimeter

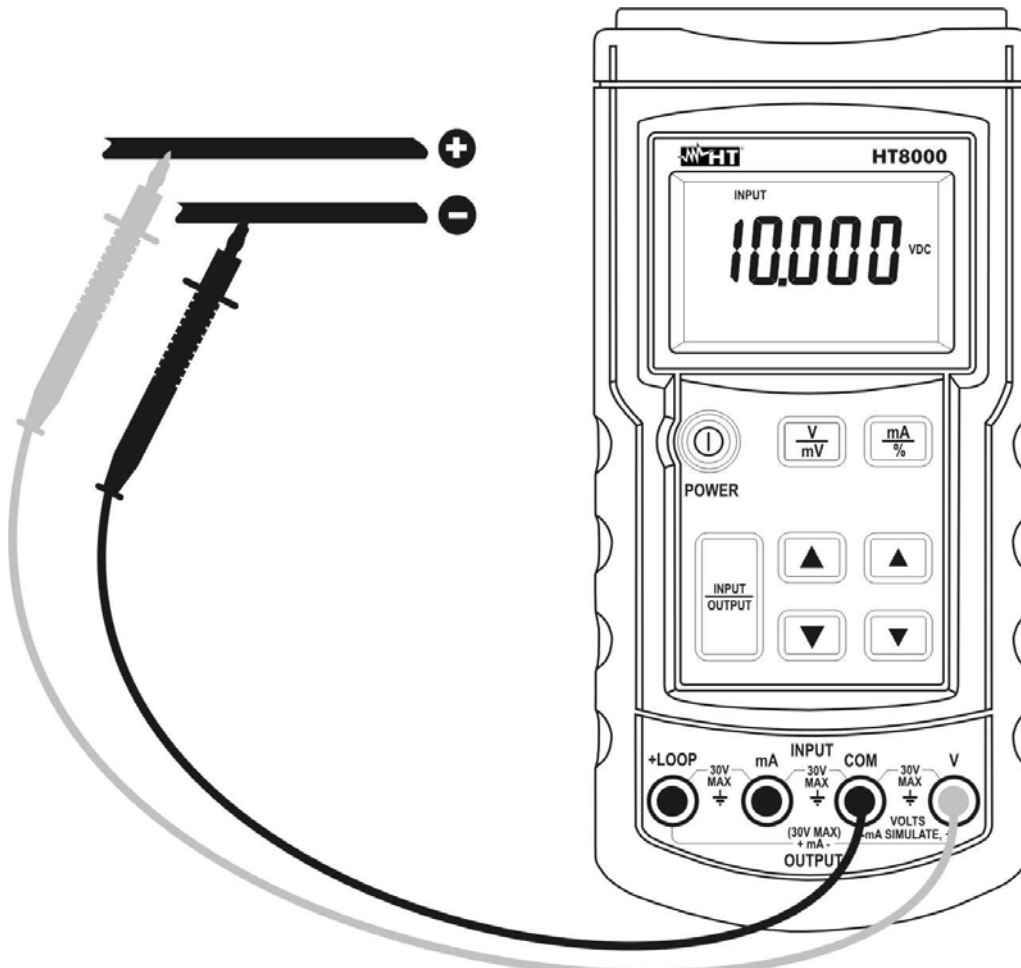


Fig. 2: DC Voltage measurement

1. Press **INPUT/OUTPUT** key and select the measurement mode. The "INPUT" symbol is displayed
2. Press **V/mV** key and select the desired measurement unit. The symbol "V" or "mV" is displayed
3. Insert the red plug into **V** jack and the black plug into **COM** jack
4. Connect the red and black test leads to the positive and negative poles of the circuit under test respectively (see Fig. 2). The voltage value will be displayed
5. The message "**O.L**" means that the voltage exceeds the measuring limits. The symbol "**-O.L**" on the display means that voltage has opposite polarity respect the connection shown in Fig. 2



### 4.3.2. DC Voltage generation



#### CAUTION

Maximum input for DC voltage is 30V. Do not attempt to take any voltage measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument.

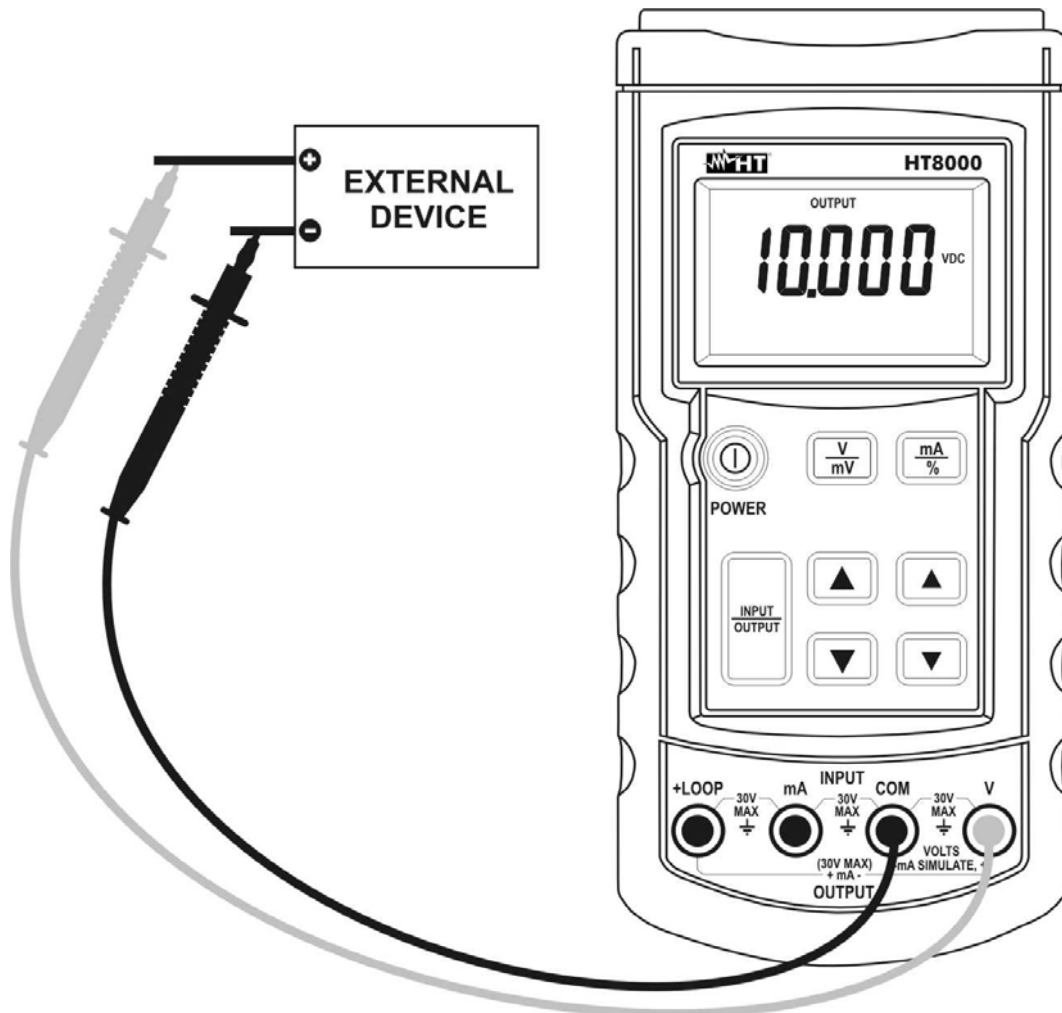


Fig. 3: DC Voltage generation

1. Press **INPUT/OUTPUT** key and select the generation mode. The “OUTPUT” symbol is displayed
2. Press **V/mV** key and select the desired measurement unit. The symbol “V” or “mV” is displayed
3. By means arrow keys ▲ and ▼ (see Fig. 1 – parts 9, 10, 11 and 12) to set the value of output generated voltage. The maximum set values are 100mV and 10V. The voltage value will be displayed
4. Insert the red plug into **V** jack and the black plug into **COM** jack
5. Connect the red and black test leads to the positive and negative poles of the external device respectively (see Fig. 3).
6. For the generation of a negative value of voltage connect the test leads in the opposite direction than shown in Fig. 3

### 4.3.3. DC current measurement

#### CAUTION



Maximum input for DC current is 24mA. Do not attempt to take any current measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument

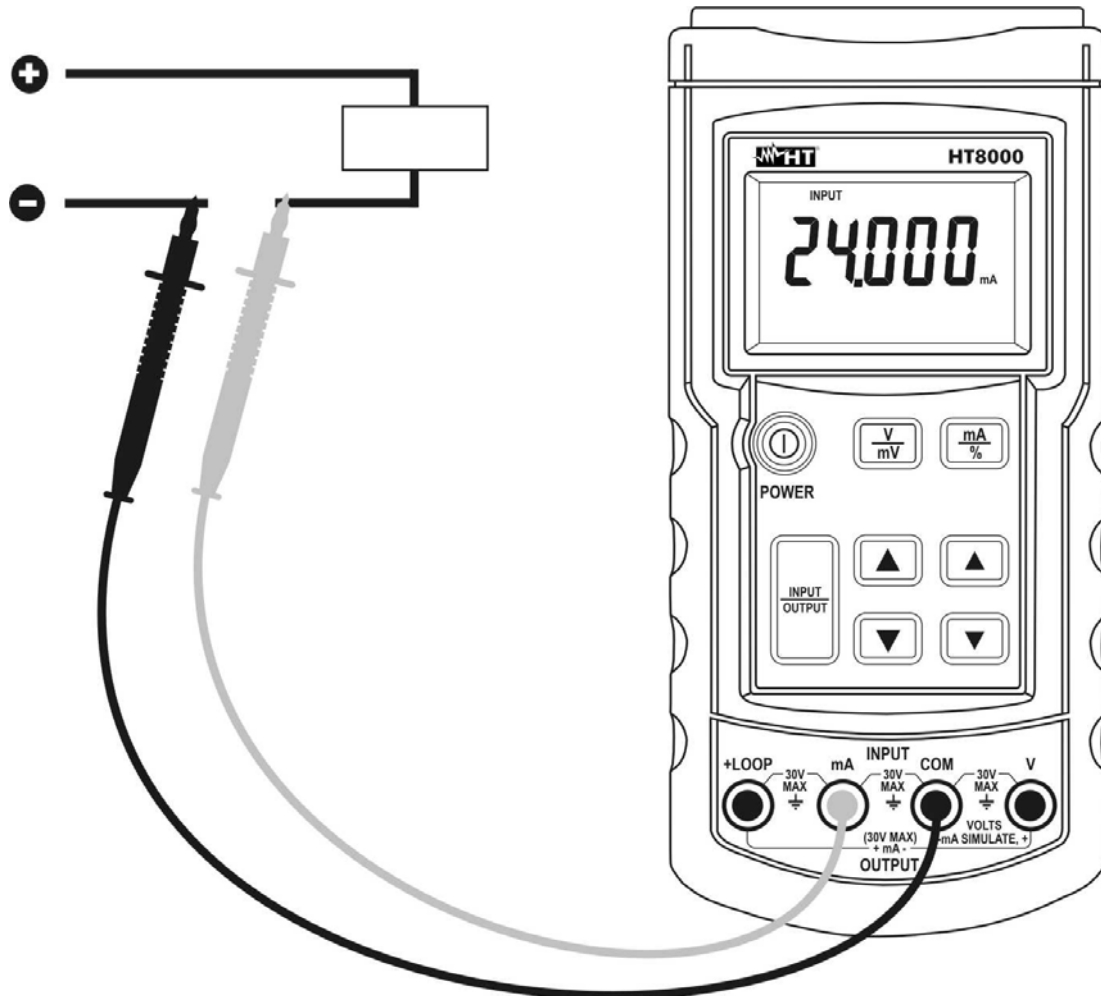


Fig. 4: DC current measurement

1. Switch OFF the circuit under test
2. Press **INPUT/OUTPUT** key and select the measurement mode. The "INPUT" symbol is displayed
3. Press **mA/%** key and select the desired measurement unit. The symbol "mA" or "mA%" is displayed
4. Insert the red plug into **mA** jack and the black plug into **COM** jack
5. Connect red and black plugs in series with the circuit under test respecting the polarity and current flow (see Fig. 4).
6. Power the circuit under test. The current value will be displayed
7. The message "**O.L**" means that the current exceeds the measuring limits. The symbol "**-O.L**" on the display means that current has opposite direction than shown in Fig. 4

## 4.3.4. DC current generation

**CAUTION**

The maximum DC current generated by the instrument is 24mA with DC voltage of current generator max 24VDC

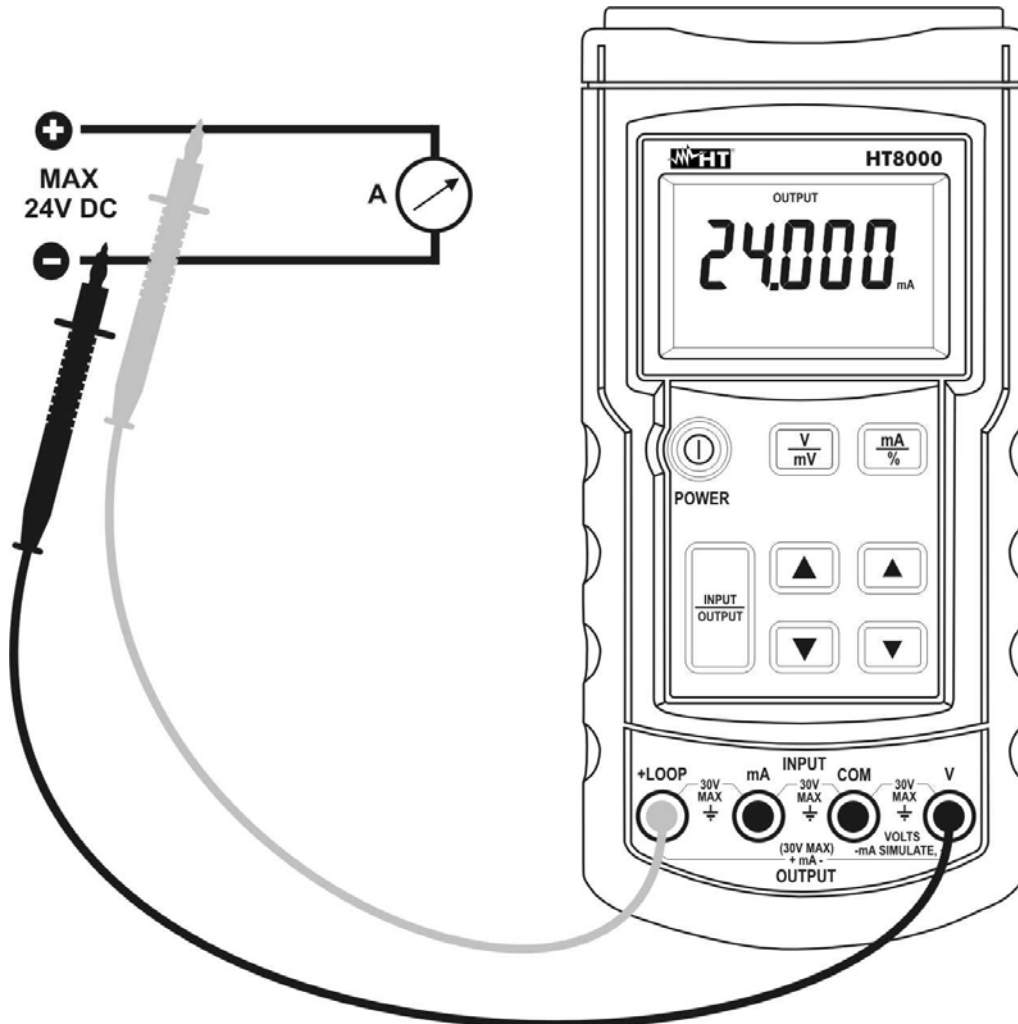


Fig. 5: DC current generation

1. Press **INPUT/OUTPUT** key and select the generation mode. The "OUTPUT" symbol is displayed
2. Press **mA/%** key and select the desired measurement unit. The symbol "mA" or "mA%" is displayed
3. Insert the red plug into **+LOOP** jack and the black plug into **V** jack
4. Connect the red and black test leads respectively to the positive and negative poles of the external device which should receive the power supply (see Fig. 5)
5. By means arrow keys ▲ and ▼ (see Fig. 1 – parts 9, 10, 11 and 12) to set the value of output generated current. The maximum set value is 24mA DC. For the "mA%" output consider that -25% = 0mA, 0% = 4mA, 100% = 20mA and 125% = 24mA. The current value will be displayed
6. For the generation of a negative value of current connect the test leads in the opposite direction than shown in Fig. 5

#### 4.3.5. Loop current measurement of external transducers

### CAUTION



- In this mode the instrument generate a fixed output voltage of 24VDC which permits to supply an external transducer and perform the simultaneous current measurement on it
- Maximum input for DC current is 24mA. Do not attempt to take any current measurement exceeding such limit to avoid the risk of electrical shock and damages to the instrument

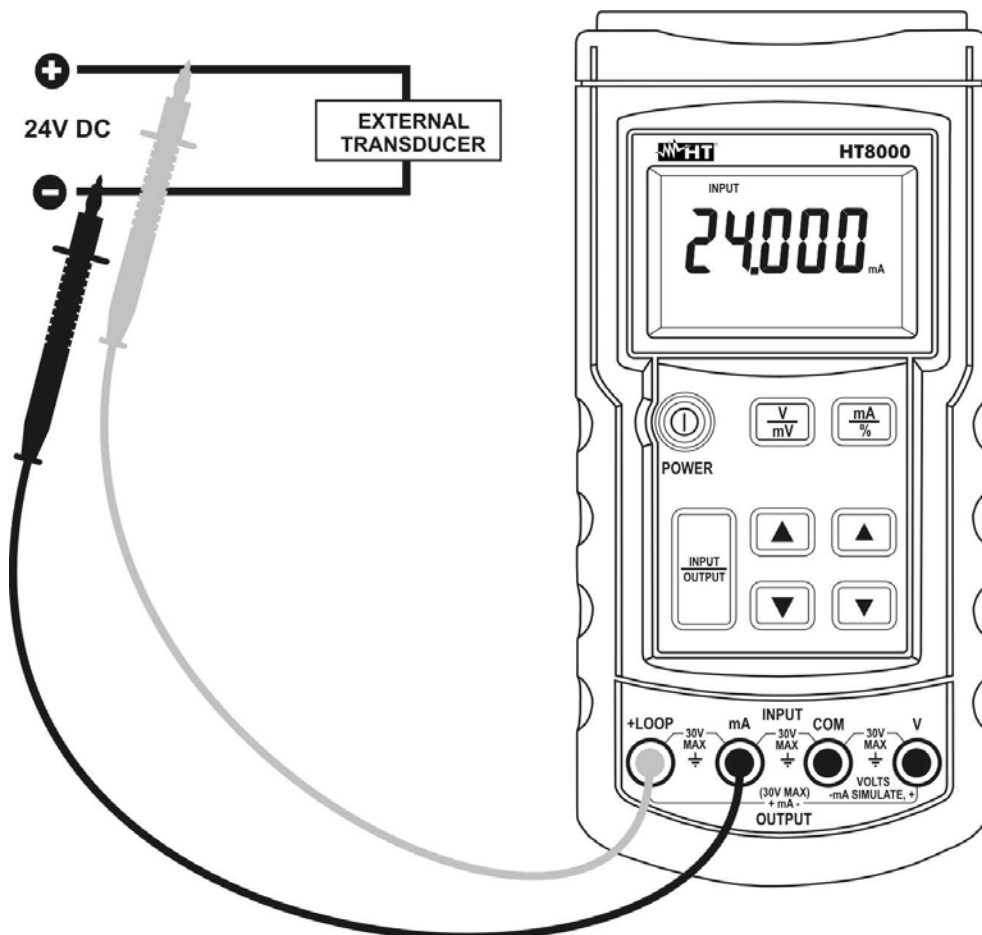


Fig. 6: Loop current measurement of external transducers

1. Switch OFF the circuit under test
2. Press **INPUT/OUTPUT** key and select the measurement mode. The "INPUT" symbol is displayed
3. Press **mA/%** key and select the desired measurement unit. The symbol "mA" or "mA%" is displayed
4. Insert the red plug into **+LOOP** jack and the black plug into **mA** jack
5. Connect red and black plugs to the external transducer respecting the polarity and current flow (see Fig. 6).
6. Power the circuit under test. The current value will be displayed
7. The message "**O.L**" means that the current exceeds the measuring limits. For the generation of a negative value of voltage connect the test leads in the opposite direction than shown in Fig. 6

#### 4.3.6. Simulating of a transducer

### CAUTION



In this mode the instrument generate a output current up to 24mADC. It is necessary the use of a external power supply with 30VDC maximum voltage to perform the adjustment of the current

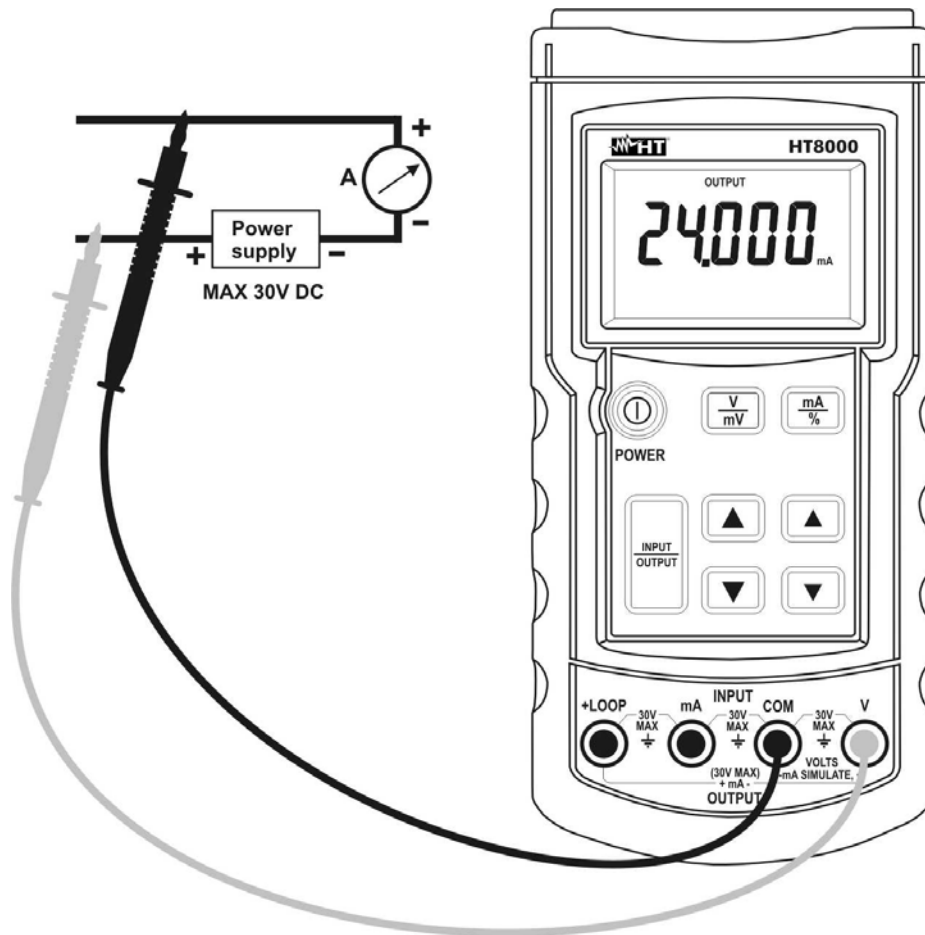


Fig. 7: Simulating of a transducer

1. Press **INPUT/OUTPUT** key and select the generation mode. The “OUTPUT” symbol is displayed
2. Press **mA/%** key and select the desired measurement unit. The symbol “mA” or “mA%” is displayed
3. Insert the red plug into **V** jack and the black plug into **COM** jack
4. Connect the red and black test leads respectively to the positive of the external power supply and positive pole of the external measurement device (e.g. multimeter – see Fig. 7)
5. By means arrow keys ▲ and ▼ (see Fig. 1 – parts 9, 10, 11 and 12) to set the value of output generated current. The maximum set value is 24mA DC with DC voltage fixed to 24V DC. For the “mA%” output consider that -25% = 0mA, 0% = 4mA, 100% = 20mA and 125% = 24mA. The current value will be displayed
6. For the generation of a negative value of current connect the test leads in the opposite direction than shown in Fig. 7

## 5. MAINTENANCE

### 5.1. GENERAL INFORMATION

1. This is a precision instrument. To guarantee its performances be sure to use it according to these instructions and keep it stored on suitable environmental conditions.
2. Do not expose it to high temperatures or humidity or direct sunlight.
3. Be sure to turn it off after use. If you expect not to use the instrument for a long period remove batteries to avoid leakages of battery liquid which could damage the its inner components.

### 5.2. BATTERY REPLACEMENT

When the symbol "E+" is displayed, battery need replacement.



#### CAUTION

Before replacing battery disconnect the test leads from any energized circuits to avoid electrical shocks

1. Switch OFF the meter
2. Disconnect the test leads from the input terminals
3. Unscrew the fixing screw and remove the cover of battery case
4. Disconnect the battery and insert a new battery of the same type (see § 6.1.2) observing the proper polarity
5. Re-screw the cover of battery case
6. Use the appropriate battery disposal methods for your area

### 5.3. FUSES REPLACEMENT



#### CAUTION

The FUSE1 or FUSE2 replacement is necessary in the herewith situations:

- FUSE1 → On DC voltage generation no signal is given by the instrument
- FUSE2 → On DC current measurement the instrument always shows the "0.000" indication with a input signal applied
- FUSE2 → On DC current generation the "OUTPUT" symbol is always blinking at display and no signal is given by the instrument

1. Turn OFF the meter
2. Disconnect the test leads from the input terminals
3. Unscrew the fixing screw and remove the cover of battery case
4. Unscrew the four fixing screws and remove the lower part of the case
5. Unscrew the two fixing screws of the PCB internal protection and remove it
6. Remove the defective fuse and install a new fuse of the same size (see § 6.1.2)
7. Re-screw the PCB internal protection
8. Re-screw the lower part of the case
9. Re-screw the cover of battery case

### 5.4. CLEANING

To clean the instrument use a soft dry cloth. Never use a wet cloth, solvents or water.

### 5.5. END OF LIFE



**CAUTION:** this symbol indicates that equipment its accessories and battery shall be subject to a separate collection and correct disposal

## 6. TECHNICAL SPECIFICATIONS

### 6.1. TECHNICAL FEATURES

Accuracy calculated as [%rdg + (no. dgt x resol.)] at 18°C ÷ 28°C (64°F ÷ 82°F), <75%RH

#### DC Voltage (measured and generated)

Range	Resolution	Accuracy	Input impedance	Overload protection
0.01 ÷ 100.00mV	0.01mV	±(0.02%rdg + 2dgt)	2MΩ, <100pF	30VDC
0.001 ÷ 10.000V	0.001V			

#### DC Current (measured and generated)

Range	Resolution	Accuracy	Percentage value	Overload protection
0.001 ÷ 24.000mA	0.001mA	±(0.015%rdg + 4dgt)	0% = 4mA	Fast fuse 125mA, 250V
-25.00 ÷ 125.00%	0.01%		100% = 20mA 125% = 24mA	

Source mode: 1000Ω @ 20mA (battery voltage ≥ 6.8V) ; 700Ω @ 20mA (battery voltage within 5.8V and 6.8V)

Simulating mode: required loop voltage: 24V nominal, 30V maximum, 12V minimum

#### Loop mode

Range	Resolution	Accuracy	Overload protection
24V DC	Not necessary	±10%	30VDC

#### 6.1.1. Reference standards


Safety:	IEC/EN61010-1
Insulation:	double insulation
Pollution degree:	2
Max height of use:	3000m (9843 ft)

#### 6.1.2. General data

##### Mechanical characteristics

Dimensions (L x W x H):	190 x 89 x 42mm, 7 x 4 x 2 inches
Weight (including battery):	350g (12 ounces)

##### Power supply

Battery type:	1x9V alkaline NEDA1604, 006P, IEC6F22
Low battery indication:	"  "
Battery life:	4 hours (1604 type), 2hours (006P type)
Auto Power OFF:	after 6 minutes of idleness (disabled)

##### Display

Specifications:	5 LCD + symbol, decimal point
Over range indication:	" <b>O.L</b> " message at display
Negative value indication:	" <b>-O.L</b> " message at display for the herewith values: <-2mV [100mV], <-0.2V [10V], <-1mA [24mA]
Fuses	type FF 125mA/250V, 5x20mm, 0.03kA

## 6.2. ENVIRONMENT

### 6.2.1. Environmental conditions

Reference temperature:	18°C ÷ 28°C ; (64°F ÷ 82°F)
Working temperature:	-10 ÷ 55°C ; (14°F ÷ 131°F)
Relative humidity:	<75%RH
Storage temperature:	-40 ÷ 60°C ; (-40°F ÷ 140°F)

**This product conforms to the prescriptions of the EMC directive 2004/108/EEC**

### 6.3. ACCESSORIES

- Couple of test leads – Cod. KIT4000A
- User manual
- Battery

## 7. SERVICE

### 7.1. WARRANTY CONDITIONS

This instrument is guaranteed for one year against material or production defects, in accordance with our general sales conditions. During the warranty period the manufacturer reserves the right to decide either to repair or replace the product.

Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it. Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.

The warranty doesn't apply to:

- Accessories and batteries (not covered by warranty).
- Repairs made necessary by improper use (including adaptation to particular applications not foreseen in the instructions manual) or improper combination with incompatible accessories or equipment.
- Repairs made necessary by improper shipping material causing damages in transit.
- Repairs made necessary by previous attempts for repair carried out by non skilled or unauthorized personnel.
- Instruments for whatever reason modified by the customer himself without explicit authorization of our Technical Dept.
- Use not provided by the instrument's specifications or in the instruction manual.

The contents of this manual may not be reproduced in any form whatsoever without the manufacturer's authorization.

**Our products are patented and our logotypes registered. We reserve the right to modify specifications and prices in view of technological improvements or developments which might be necessary.**

### 7.2. SERVICE

Shouldn't the instrument work properly, before contacting your distributor make sure that batteries are correctly installed and working, check the test leads and replace them if necessary.

Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it.

Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.

The manufacturer will not be responsible for any damage to persons or things.