


# TECHNICAL MANUAL

## Digital multimeter
## MS8211 EKF EXPERT

**SAFETY INFORMATION**

The digital multimeter MS8211 EKF EXPERT complies with IEC 61010-1:2001 in terms of safety requirements, and IEC 61326-2-1:2005 and IEC 61326-2-2:2005 in terms of electromagnetic compatibility.

To ensure safe operation of the device, follow the instructions herein.

The safety symbols used herein are listed in Table 1.

Table 1

| | |
|---|---|
|  | Important safety information |
|  | High voltage may be present |
|  | Grounding |
|  | Double insulation |
|  | The fuse can be replaced by a similar one with the parameters specified herein |

**SAFETY INSTRUCTIONS:**

- Use sockets, functions and measuring ranges as described herein.
- Do not use the device if its housing is damaged. Pay particular attention to the connection sockets.
- Use only original probes from this device model. Do not use defective probes. Check insulation of the probes regularly. When measuring, keep your fingers behind the barrier edge of the probes.
- Do not use the device with the back lid open or the housing loosely closed.
- Never exceed overload capacity values of the device specified for each measuring range.
- Do not touch any open sockets when the device is connected to the measured circuit.
- If you do not know the measured value order before measuring, set the range switch to the maximum value.
- Before turning the range switch, disconnect the probes from the measured circuit.
- When measuring in TV sets and static power supplies, be aware that high voltage pulses may be present at the measured points, which can damage the device.
- Disconnect power and discharge high voltage capacitors when measuring electrical resistance, testing circuit continuity and diodes.
- Never measure resistance in a closed circuit.
- Replace the battery as soon as the battery symbol  appears.
- Be careful whenever dealing with voltage over 60 VDC or 30 VAC.



If you fail to observe the manufacturer's operating instructions, the protection of the device may be degraded.

Stop using the device immediately if any malfunctions or faults occur. The device shall be serviced and repaired only by authorized service companies.

For cleaning of the product, use a soft cloth; do not use abrasives or solvents.

**1 DESCRIPTION**

The digital multimeter MS8211 EKF EXPERT is a high-quality measuring instrument with a wide range of functions for everyday use:

- DC / AC voltage measurement DCV/ACV ( V≂ )
- DC / AC measurement DCA/ACA ( mA≂ )
- Electrical resistance measurement ( Ω )
- Frequency measurement ( Hz )
- Capacitance measurement ( ⊣⊢ )
- Diode test ( ⊣◀ )
- Circuit continuity test / buzzer ( •)) )
- Data Hold (HOLD)
- Non-contact voltage detection ( NCV )
- Display backlight / Work area backlight ( ☼ )
- Auto power off (Apo).

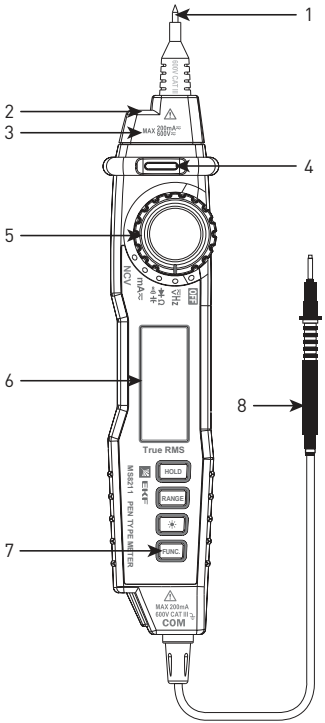
⚠ CAUTION!

If you do not operate the device for 15 minutes, it will emit 5 short beeps. In one more minute the device will emit one long beep and power off.

After auto power off, turn the rotary switch, or push either «**FUNC**» or «**HOLD**» button to power on the device.

Press the «**FUNC**» button to return the device to operation or cancel the auto power off function.

## 2 FRONT PANEL ELEMENTS




1. Internal probe (red)
2. Flashlight to backlight the work area
3. Non-contact voltage tester
4. Non-contact voltage LED
5. Rotary switch
6. LCD display 3 1/2 digits
7. Control panel («**HOLD**» button, «**RANGE**» button, « ☀ » button, «**FUNC**» button)
8. Remote probe (black) (**COM**)

Figure 1. Front panel elements

| Button | Function |
|---|---|
| HOLD | Current value hold. Press the button again to reset the reading and return to the regular measurement mode. |
| RANGE | Switching between auto and manual mode for selecting the measurement range |
| ☀ | Display backlight / Work area backlight |
| FUNC | Switching between functions |

## 3 TECHNICAL DATA

Table 2

| Characteristics | Value |
|---|---|
| Measuring range selection | Manual / Auto |
| Maximum display value | 1999 counts |
| Measurement method | Double-integrated ADC |
| Measurement rate | 3 measurements per second |
| Overload indicator | "OL" symbol on LCD display |
| Low battery indicator | symbol «  » on LCD display |
| Polarity indicator | symbol « - » for negative polarity |
| Safety category | 600V CATIII |
| Housing insulation | double, class II |
| Fuses | 250 mA/250 V |
| Degree of protection by IEC 60529 | IP20 |
| Operating temperature, °C | from 0 to +40 at relative humidity of max. 80% |
| Altitude above sea level, m | max. 2000 |
| Power supply | Battery 2x1,5V AAA |
| Dimensions, mm | 225x38x26 |
| Weight, g | 110 (with battery) |

DC VOLTAGE

| Range | Resolution | Accuracy |
|---|---|---|
| 200 mV | 0,1 mV | ± 0,5% ± 3D |
| 2 V | 0,001 V | |
| 20 V | 0,01 V | |
| 200 V | 0,1 V | |
| 600 V | 1 V | ± 0,8% ± 5D |

* D - least significant digit value
Input resistance: 10 MOhm
Maximum input voltage: 600 V DC or AC (RMS)

AC VOLTAGE

| Range | Resolution | Accuracy |
|---|---|---|
| 2 V | 0,001 V | ± 0,8% ± 3D |
| 20 V | 0,01 V | |
| 200 V | 0,1 V | |
| 600 V | 1 V | ± 1,0% ± 5D |

Input resistance: 10 MOhm
Maximum input voltage: 600 V DC or AC (RMS)
Frequency: 40 - 400 Hz

DIRECT CURRENT

| Range | Resolution | Accuracy |
|---|---|---|
| 20 mA | 0,01 mA | ±1,8%,± 5D |
| 200 mA | 0,1 mA | |

Overload protection:
fuse 250 mA/250 V.

ALTERNATING CURRENT

| Range | Resolution | Accuracy |
|---|---|---|
| 20 mA | 0,01 mA | ±2,0% ± 5D |
| 200 mA | 0,1 mA | |

Overload protection:
fuse 250 mA/250 V.

RESISTANCE

| Range | Resolution | Accuracy |
|---|---|---|
| 200 Ohm | 0,1 Ohm | ±1,0% ± 3D |
| 2 kOhm | 0,001 kOhm | |
| 20 kOhm | 0,01 kOhm | |
| 200 kOhm | 0,1 kOhm | |
| 2 MOhm | 0,001 MOhm | |
| 20 MOhm | 0,01 MOhm | ±1,2% ± 15D |

CAPACITANCE

| Range | Resolution | Accuracy |
|---|---|---|
| 20 nF | 0,01 nF | ±4,0% ± 3D |
| 200 nF | 0,1 nF | |
| 2 µF | 0,001 µF | |
| 20 µF | 0,01 µF | |
| 200 µF | 0,1 µF | |
| 2 mF | 0,001 mF | ±5,0 % ± 3D |
| 20 mF | 0,01 mF | |

FREQUENCY

| Range | Resolution | Accuracy |
|---|---|---|
| 200 Hz | 0,1 Hz | ±0,5% ± 2D |
| 1 kHz | 0,001 kHz | |

Maximum input voltage: 600 V DC or AC (RMS)

## 4 MEASUREMENTS

WARNING!
Never exceed overload capacity values of the device specified for each measuring range.

MANUAL AND AUTO MODE FOR SELECTING MEASUREMENT RANGE

1. When you switch the multimeter to voltage, current and resistance measurement, auto mode for selecting the measurement range is set (AUTO is displayed).
2. Entry/exit from manual mode of range switching:
- In the auto mode, press the «**RANGE**» button, the «AUTO» symbol on the screen will disappear.
- Press the «**RANGE**» button to extend the range. Once the maximum range is reached, the device will automatically reset to the minimum range.
- Press and hold the «**RANGE**» button for 2 seconds to exit the manual range selection mode, the «AUTO» symbol will appear.

Notice!
There is only one range for the diode test and continuity test functions.

DC AND AC VOLTAGE MEASUREMENT (**V≂**)

1. Use the rotary switch to select the desired mode ( **V̄ṽHz** ).
2. Use the «**FUNC**» button to select the desired voltage measurement mode (DC or AC).
3. Connect the probes to the circuit or parallel to the circuit, and measure the voltage.
4. Read the value and polarity of the tested voltage on the display. When measuring DC voltage, the polarity of the voltage is also displayed with the red probe used.
5. When the work is finished, put the rotary switch to the «**OFF**» position.

When the measurement is finished, disconnect the probes from the measured circuit.

DC AND AC MEASUREMENT ( **mA≂** )

1. Use the rotary switch to select the desired mode ( **mA≂** ).
2. Use the «**FUNC**» button to select the desired current measurement mode (DC or AC).
3. Switch off the power supply of the circuit to be measured. Discharge all capacitances in the circuit. Disconnect the circuit. Connect the probes in series to the circuit.
4. Connect to the circuit power supply; the measured value will be displayed. If only the «**OL**» symbol is displayed, the measurement range of this multimeter has been exceeded. For DC measurement, polarity of the current is also displayed.
5. When the work is finished, put the rotary switch to the «**OFF**» position.

When the measurement is finished, disconnect the probes from the measured circuit.

RESISTANCE MEASUREMENT ( Ω )

1. Use the rotary switch to select the desired mode ( ⊣Ω / ◦))⊣⊢ ).
2. Use the «**FUNC**» button to select the resistance measurement mode ( Ω ).
3. Connect the probes to the measured resistance and read the value on the display.
4. When the work is finished, put the rotary switch to the «**OFF**» position.

⚠ If the measured resistance is set in the circuit, disconnect the power and discharge all capacitances of the circuit before measuring.

⚠ When the measurement is finished, disconnect the probes from the measured circuit

CIRCUIT CONTINUITY TEST / BUZZER ( •)) )

1. Use the rotary switch to select the desired mode ( ⊣Ω / ◦))⊣⊢ ).
2. Use the «**FUNC**» button to select circuit continuity test mode.
3. Connect the probes to two points of the measured circuit. In case of electrical contact between the points (resistance is less than 50 Ohm), the buzzer will sound.
4. When the work is finished, put the rotary switch to the «**OFF**» position.

⚠ When the measurement is finished, disconnect the probes from the measured circuit.

CAPACITANCE MEASUREMENT ( ⊣⊢ )

1. Use the rotary switch to select the desired mode ( ⊣Ω / ◦))⊣⊢ ).
2.Use the «**FUNC**» button to select the capacitance measurement mode ( ⊣⊢ ).
3. Connect the probes to the tested resistance and read the value on the display.
If the measured resistance is set in the circuit, disconnect the power and discharge all capacitances of the circuit before measuring.

⚠ When the measurement is finished, disconnect the probes from the measured circuit.

FREQUENCY MEASUREMENT ( Hz )

1. Use the rotary switch to select the desired mode ( ~V Hz ) .
2. Use the «**FUNC**» button to select the frequency measurement mode ( Hz ) .
3. Connect the probes to the tested circuit and read the value on the display.

⚠ When the measurement is finished, disconnect the probes from the tested circuit.

DIODE TEST ( ⊣◀ )

1. Use the rotary switch to select the desired mode ( ⊣◀Ω / ))⊣ ).
2. Use the «**FUNC**» button to select the diode test mode.
3. Connect the red probe to anode, and the black probe to the cathode of the tested diode. The display will show the approximate voltage drop in the diode when the direct current is flowing through it.
4. In case of reverse connection or open circuit, the «**OL**» symbol will be displayed.
5. When the work is finished, put the rotary switch to the «**OFF**» position.

⚠ When the measurement is finished, disconnect the probes from the tested circuit.

NON-CONTACT VOLTAGE DETECTION ( **NCV** )

1. Use the rotary switch to select the desired mode ( **NCV** ).
2. Move the sensor (at the top of the device) within 5 mm to the tested wire.
3. If AC voltage is detected in the cable, the NCV LED will light up and the buzzer will sound.
4. When the work is finished, put the rotary switch to the «**OFF**» position.

⚠ When the measurement is finished, disconnect the probes from the tested circuit.

BATTERY AND FUSE REPLACEMENT

If the symbol « ▭ » is displayed, the battery needs to be replaced. The fuse rarely needs to be replaced and frequently blows due to user's error. To replace the battery and fuse, remove the screws on the back lid of the device. Remove the failed element and replace it with a new one. Observe polarity of the battery. Close the housing, tighten the screws.

⚠ Before replacing the battery, make sure that the probes and thermocouple are disconnected from the tested devices and the rotary switch is in the «**OFF**» position.

**4 DELIVERY SCOPE**

1. Multimeter - 1 pc.
2. Battery 1,5 V - 2 pcs.
3. Bag - 1 pc.
3. Technical and operation manual - 1 pc.

**5 TRANSPORTATION AND STORAGE**

The product shall be transported in compliance with the transportation regulations applicable to each means of transport. The product shall be protected against mechanical impact during storage and transportation. The product shall be stored in heated and ventilated space at the ambient temperature from -25 to +35 °C and relative humidity of max. 70%. Do not expose to direct sunlight and precipitations. Do not store near acid and alkali.

## 6 DISPOSAL

Life-expired and failed devices shall be disposed of in compliance with the national and local laws and regulations in force. To dispose of the product, send it to an authorized company for recycling in compliance with the national and local laws and regulations in force.

## 7 MANUFACTURER'S WARRANTY

The manufacturer guarantees the products comply with the declared characteristics, provided that the consumer follows the operation, transportation and storage conditions.

**Service life:** 10 years.

**Shelf life:** 10 years from the date of manufacture.

**Warranty period:** 12 months from the date of sale.

**Manufacturer:** For information, refer to the product package.

**Importer and EKF trademark service representative:** EKF ELECTRICAL SOLUTION – FZCO, Dubai Silicon Oasis, DDP, Building A2, Dubai, United Arab Emirates.

**Importer and EKF trademark service representative on the territory of the Russian Federation:** ООО «Electroresheniya», Otradnaya st., 2b bld. 9, 5th floor, 127273, Moscow, Russia. Tel.: +7 (495) 788-88-15.

**Importer and EKF trademark service representative on the territory of the Republic of Kazakhstan:** ТОО «Energoresheniya Kazakhstan», Kazakhstan, Almaty, Bostandyk district, Turgut Ozal st., 247, apt 4.

## 8 CERTIFICATE OF ACCEPTANCE

The digital multimeter MS8211 EKF EXPERT has been manufactured in compliance with laws and regulations in force and has been approved for operation.

Quality control stamp




**Date of manufacture:**
For information, refer to the product package.

## 9 NOTE OF SALE

Date of sale

Seller's signature

Seller's seal

**www.ekfgroup.com**