

Technical Data:

Display:	Double scale 0 ... 3 / 0 ... 10, linear, zero-point left, mirrored Scale arc length: approx. 86 mm Double scale -5 ... 0 ... +5 / -1 ... 0 ... +1, linear, zero-midpoint Scale arc length: approx. 41 mm
Zero correction:	Adjustment screw for mechanical zero-point correction
Measuring device:	Moving-coil system
Accuracy:	DC voltage: $\pm 2\%$ AC voltage: $\pm 3\%$
General purpose:	horizontally or slightly inclined
Measuring ranges:	DC and AC voltages: 1 mV, 100 mV, 300 mV, 1 V, 3 V, 10 V, 30 V DC and AC amperages: 100 μ A, 10 mA, 30 mA, 100 mA, 300 mA, 1 A, 10 A
Internal resistance:	100 k Ω /V
Frequency response:	-1,5 db at 20 kHz
Overload protection:	electronically, with control-light display (no glass-pipe micro fuse required)
Power supply:	4 x 1.5 V mignon cells (alkaline recommended)
Case:	Plastics, ABS
Dimensions:	approx. 200 x 140 x 110 mm
Weight:	approx. 637 g

Take care that the device does not fall. In the event that this does occur, have the device examined or repaired by authorized service personnel.

In the event that unforeseen difficulties arise during operation, contact the dealer.

Do not subject the device to dripping or sprayed water.

This device may only be operated by qualified personnel or by persons they instruct in its use.

NTL - Fruhmann GmbH - 7372 Karl, Austria

NTL

P3212-20 Multimeter analogue 20



The analogue multimeter serves to measure DC and AC voltage as well as DC and AC amperage. An ideal and versatile measuring device with two double scales, designed specially for students.

The scales 0...3 / 0...10 have the zero point on the left boundary of the scale. For measurements involving a possible change of the plus or minus sign in front of the value read, the device can be switched to the scales -5...0...+5 / -1,5...0 ...+1,5 with the zero point at the midpoint of the scale.

The double scale 3 / 10 is mirrored in order to guarantee accurate readings.

The analogue multimeter is electronically overload-protected in all areas.



- 1 Double scale 0 ... 3 / 0 ... 10, linear, to be used for measurements with zero at the left side
- 2 Indicator needle
- 3 "BAT" scale for checking battery capacity
- 4 Mirrored scale for exact readings
- 5 Double scale -5 ... 0 ... +5 / -1,5 ... 0 ... +1,5, linear, to be used for measurements with zero at midpoint
- 6 Mode switch: AC, DC, zero-midpoint, battery check
- 7 4 mm safety receptacle "COM" (black) - common ground
- 8 4 mm safety receptacle "V/A" (red), positive terminal for current and voltage measurements (all measuring ranges up to 1 A)
- 9 4 mm safety receptacle "10 A" (red), positive terminal for current measurements (measuring range 10 A)
- 10 Step switch for selecting measuring range:
1 mV, 100 mV, 300 mV, 1 V, 3 V, 10 V, 30 V
100 μ A, 10 mA, 30 mA, 100 mA, 300 mA, 1 A
- 11 Adjustment screw for mechanical setting of the zero-point
- 12 Overload-display

Operation:

1) The analogue multimeter is always ready for operation (as long as the batteries are properly functioning).

2) The type of power to be measured is set by using the mode switch (6). In addition, in the case of direct current, this switch is used to select between zero at midpoint or at the left side. The adjustment screw (11) can be turned appropriately in order to set the needle to zero if necessary.

3/a) When measuring current, set the step switch for selecting measurement range (10) to the largest possible measurement range, 1 A, for the applicable current type (AC/DC). Only for measuring current > 1 A the connecting wire is to be unplugged from receptacle (8) and plugged into receptacle (9). In this fashion the device is automatically switched to the 10 A measurement range. Under alternating current the indicator needle always moves to the right, under direct current it moves to the right when the positive terminal of the power source is connected to receptacle "V/A" (8) or "10 A" (9) and to the left when the positive terminal is connected to receptacle "COM" (7).

3/b) When measuring voltage, only the receptacles "COM" (7) and "V/A" (8) are used. The step switch for selecting measurement range (10) is set to the largest measurement range, 30 V. Select the appropriate current type using the mode switch (6). Switch the step switch (10) to a more sensitive range only after the power supply has been connected. The indicator needle moves in the same way as when measuring current.

Note: the current measurement range 100 μ A corresponds to a voltage measurement range of 100 mV.

Overload protection: The measuring element and the internal measuring circuits are electronically protected against the occurring overload. The maximum guaranteed holding current is 7 A at 20 °C and 5.81 A at +40 °C. Continuous measurements > 7 A are therefore not possible. At 20 °C and 18 A the unit interrupts the measurement within about 30 seconds, at 40 A within about 4 - 12 seconds. The maximum voltage is 30Vrms. The short-term maximum current is 100 A.

Battery check: Turn the mode switch (6) all the way to the left. If the needle moves all the way to the right within the measuring scale "BAT", then the batteries' capacity is alright. In order to replace the four 1.5 V mignon cells, remove the rear panel. Only **alkaline batteries** are recommended to be used with this device.

Turning off the measuring device: If the mode switch (6) is set to DC („OFF“), the set of batteries should theoretically last about 10 years. The effective operating time is limited by the natural durability of the batteries (Please check the information on the battery package).

Should the device not be used for several months at a time, remove the batteries so as not to damage the device in the case of battery seepage.

A special feature of this device is the very good frequency response: typical -1,5 db at 20 kHz. Therefore measurements are possible in all kinds of resonance circuits.