

**NIGOS**  
ELEKTRONIK·NIS

**RVD-904**

Prenosni vlagomer  
Portable moisture meter



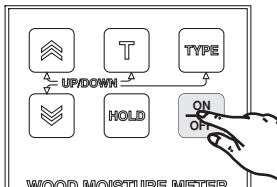
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## 1. QUICK REFERENCE GUIDE

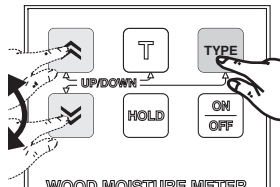
### 1. Turning the meter ON

- Press the button  briefly
- Immediately after powering on, the device is ready for parameter setting and measurement



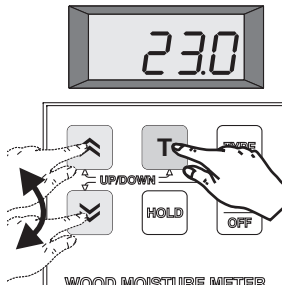
### 2. Wood type adjustment

- Press and hold button  ; use  and  to adjust parameter **WOOD TYPE**



### 3. Wood temperature adjustment

- Press and hold button **T** ; use **↑** and **↓** to adjust **WOOD TEMPERATURE**

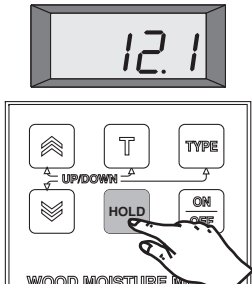


### 4. Probes setting and connection

- place the probes (electrodes) perpendicularly to wood fibers and hammer them in timber board using action hammer to the depth of 1/3 of the timber board
- connect probes and moisture meter **RVD-904** using measurement cable

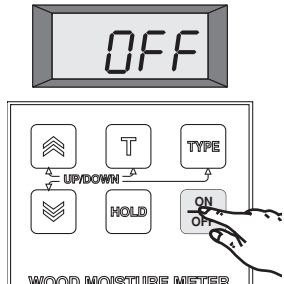
## 5. Measurement - moisture content reading

- Turn the meter on and wait for reading to stabilize. Read the measured value.
- If needed, press briefly button **HOLD** to hold the measured value displayed for later reading

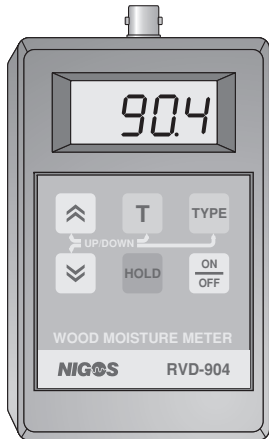


## 6. Turning the meter OFF

- Press the button **ON/OFF** briefly



## 2. TECHNICAL SPECIFICATION



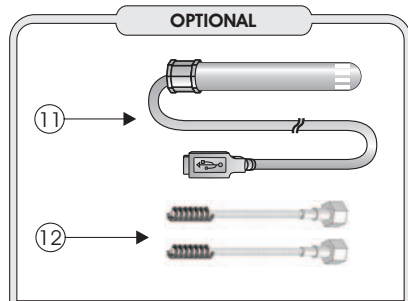
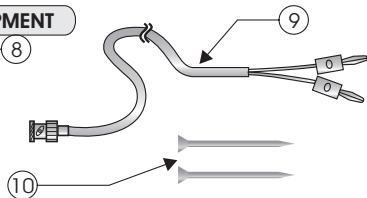
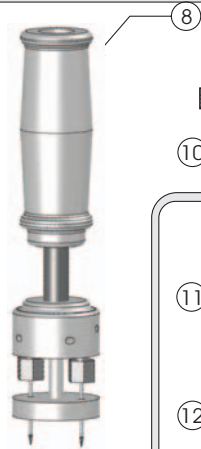
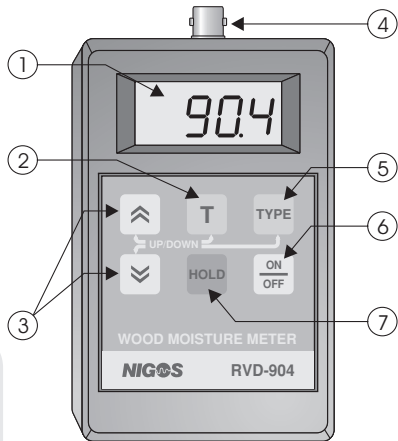
### GENERAL CHARACTERISTICS

Power supply	9V battery, Alkaline or NiCd Aku.
Display	LCD, digital
Operating conditions	T: 5 ÷ 50 °C; RH: 5 ÷ 80%
Storage	T: - 40 ÷ 50 °C; RH: 5 ÷ 90%
Dimensions (W x H x D)	(80 x 150 x 40) (mm)
Weight	200 g

### MEASUREMENT

Measurement resolution	0.1 %
Measurement range	(4 ÷ 100) (%)

### 3. DESCRIPTION OF MOISTURE METER AND ADDITIONAL EQUIPMENT



## RVD-904 FRONT SIDE LAYOUT

1. **LC DISPLAY** shows:
  - measured moisture content
  - parameter values
  - error notes during measurement
2. Button **WOOD TEMPERATURE**
3. Buttons **UP** and **DOWN** used for increasing and decreasing of value of selected parameter
4. **BNC** connector for measurement cable
5. Button **WOOD TYPE**
6. **ON / OFF** button
7. Button **HOLD**

## ADDITIONAL EQUIPMENT

8. **Action hammer** for probes inserting
9. **Measurement cable** for probes connection
10. Wood **probes**
11. Temperature/Humidity **probe DSVT-03 (optional)**
12. Concrete **probes (optional)**

Universal portable moisture meter **RVD-904** is built for wood, concrete and other materials moisture content measurement. Device is placed in the plastic case with large display for indication of all measurement data and flat keyboard for device control.

Standard set of equipment consists of device itself, set of wood probes, action hammer for probes insertion and measurement cable for probes and meter inter-connection. BNC connector on the top side of meter is for measurement cable connection.

Optionally (on user request), air temperature/humidity probe **DSVT-03** and/or pair of concrete probes are delivered. In first case, additional connector (USB type) is installed on top side of portable meter **RVD-904** beside BNC connector. This connector is used for connection of air temperature/humidity probe **DSVT-03**.



## 4. DEVICE SET-UP AND ADJUSTMENT FOR MEASUREMENT

Certain parameters which depend on measured sample and measurement conditions must be adjusted before measurement. This is crucial because measured moisture content greatly depends on parameter settings.

### 4.1 WOOD TYPE (or CONCRETE TYPE) parameter setting

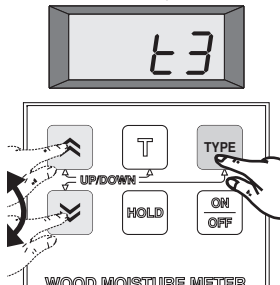
Information regarding type of wood (or concrete) is defined by the value of parameter **TYPE**, which represent the group - type of measured sample. All wood species are divided into 4 groups, represented by values  $t 1$  to  $t 4$ , and appropriate value must be entered for the parameter **TYPE**.

Also, different types of construction materials are divided into 6 groups:  $b 1$ ,  $b 2$ ,  $b 3$ ,  $b 15$ ,  $b 25$  and  $b 35$  according to their characteristics.

Information regarding wood type for most common wood species are given in Appendix, or some other reliable sources can be used.

Parameter setting procedure: Press and hold the button **TYPE** and use

the buttons  (**DOWN**) or  (**UP**) to adjust desired value.



## 4.2 WOOD TEMPERATURE (or CONCRETE TEMPERATURE) parameter setting

Second data needed for correct wood moisture content measurement is wood temperature (most commonly wood temperature is equal to surrounding air temperature, so this data can also be used as relevant data for measurement). Temperature is entered in **°C**.

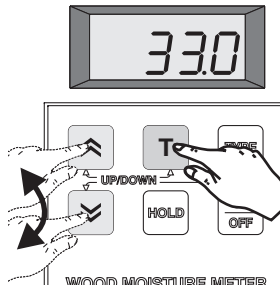
Therefore, it is necessary to measure wood or air temperature using appropriate thermometer, and enter that value as a **TEMPERATURE** parameter setting. Same procedure is needed for concrete MC measurement. Data entry procedure is similar to one used for **TYPE** parameter:

- Press and hold button **T** (**TEMPERATURE**). Device will display temperature value (in **°C**) which was last entered.

- Holding the button **T** pressed, press the buttons **⇓** (**DOWN**)

or **⇑** (**UP**) to adjust desired value for temperature. Long pressing on these buttons will provoke faster change of parameter in desired direction

- Release all buttons. After this, device will again display currently measured moisture content.



## 5. WOOD MOISTURE CONTENT MEASUREMENT

Basic purpose of this device is wood moisture content (MC) measurement. This value (MC) is represented in percent (%) of moisture. Measurement is performed in following steps:

- Probes (electrodes) are hammered in the timber using provided action hammer, perpendicular to wood fibre and at the measurement depth. Note that MC is not uniformly distributed and is highest in the middle of the board and lowest on the surface. Average MC is measured at 1/3 of the board.
- Connect the probes and instrument using measurement cable: connect BNC connector on one side of cable to RVD-904, and free endings on the other side of cable to probes hammered in the wooden sample. Measurement circle is formed this way and system is ready for measurement;
- Turn on the portable meter;
- Avoid pressing any button after powering, wait for displayed value to stabilize and make a reading;
- Turn off the portable meter;
- If necessary, repeat procedures 3 and 4. If measured values are same, measurement is successful.

**Note:** Low MC measurement require longer stabilization period (one to several seconds in practice). During extremely low MC measurement, it is necessary to repeat measurement procedure several times before accepting the measured value. Also, avoid moving around during measurement because it will influence the measurement and slow down stabilization of reading. If possible, repeat measurement in several points of wooden sample to achieve most reliable measurement data.

## 5.1 General notes regarding wood MC measurement

universal portable moisture meter **RVD-904** operation principle is based on electric resistance measurement method. Electric resistance of the wood depends on wood moisture content, with almost linear dependency in range 4% to 30% MC. For obtaining most accurate data, it is best to perform measurement in several points. Also, measurement electrodes should be inserted perpendicular to wood growing direction and at measurement depth between 1/4 and 1/3 of timber thickness. When wood with high MC is measured (above 30%, raw timber) measurement accuracy drop should be expected with MC increase. Further, wood type, temperature and other parameters influence this measurement, so data obtained should be taken with some reserve.

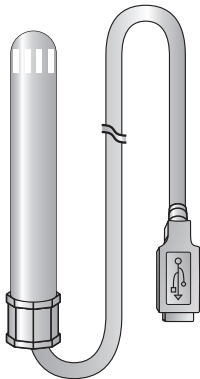
It is not recommended to measure MC in frozen wood!

**Static electricity** is common phenomenon in wood working environment, especially near dried timber. It appears in dry atmosphere environment, intensive manipulation of dried wood (especially veneer!), and is particularly developed when equipment made of artificial materials is used (for example plastic saw dust collection pipes).

High voltage discharges may occur which, although not dangerous for people, may cause measurement error and in some cases even damage portable meter. This is why all precaution measures in these environments must be taken to minimize the possibility of measurement errors and damage of device.

However, even in these conditions it is possible to make accurate measurement providing that operator is standing still and avoid any movement of measurement cable and portable meter during measurement.

## 6. AIR TEMPERATURE AND RELATIVE HUMIDITY MEASUREMENT (OPTIONAL)



### DSVT-03 PROBE GENERAL CHARACTERISTICS

Power supply	From RVD-904
Tube dimensions (D(mm) / Ø)	140 / 22
Cable length / connector	2m / USB type
Operating conditions	T: $-20 \div 80$ °C; RH: $0 \div 100\%$
Storage	T: $-40 \div 70$ °C; RH: $5 \div 90\%$
Weight	85 g

### MEASUREMENT

Output signal	Digital, encoded
Temperature accuracy	Class 1
Relative humidity accuracy	Class 2

On customer request, probe **DSVT-03** for air temperature and relative humidity measurement is delivered. In that case, additional connector for connection of this probe (USB type) is installed on moisture meter **RVD-904**. This probe can measure air temperature at which the wood timber is stored and this data can then be used as the parameter WOOD TEMPERATURE during wood moisture content measurement in case there is no better (more precise) way to timber temperature.

### 6.1 Air temperature and relative humidity measurement procedure

Air temperature and relative humidity measurement using portable moisture meter **RVD-904** and probe for air temperature and relative humidity **DSVT-03** is very simple and quick. It is only required to connect the probe to universal portable moisture meter **RVD-904** via special USB type connector, turn the meter on and press the button



to read current air temperature (in °C), id est, press the button



to read current air humidity (in %).

It is required to wait at least 1 minute before initial measurement in order to allow the sensor inside the probe to adopt to ambient conditions (if it was previously stored on significantly different temperature or humidity). Also, for more accurate measurement, if hole measurement set is taken from cold into warm room, it should be left for short time (several minutes) to adopt, and then proceed with measurement.

During temperature and humidity measurement inside the dryer, probe body should be placed inside the chamber, while part of cable with connector and portable meter is held outside of it. This is precaution measure to avoid damaging the meter if operating conditions are exceeded. Measurement should be performed after sensor is adopted to ambient conditions inside the chamber (few minutes).

## 7. CONSTRUCTION MATERIALS MOISTURE CONTENT MEASUREMENT (OPTIONAL)

Universal portable moisture meter **RVD-904** can also measure moisture content of concrete and other construction materials such as mortar and gypsum. Measurement principles are similar to ones used in wood moisture measurement, but there are few differences. First of all, expected values of measured moisture are lower than ones reached in wood measurement. Also, additional equipment and measurement procedure differs a little. There is less limitation regarding static electricity and similar disturbances.

**RVD-904** can read moisture content in certain construction materials which are divided into 6 groups. All groups have labels which are same as symbolic values used for parameter **TYPE**.

Labels and corresponding materials are given in the table:

LABEL	TYPE OF MATERIAL
b1	Concrete mortar
b2	Plaster
b3	Gypsum
b15	Concrete, Type 15
b25	Concrete, Type 25
b35	Concrete, Type 35

Additional equipment is necessary for moisture measurement in these materials and is ordered separately. Two methods for measurement are used: measurement with contact mass and measurement without it.

"**NIGOS - elektronik**" on customer request provide especially designed probes (electrodes) used for moisture measurement **without contact mass**.

## 7.1 Construction materials MC measurement procedure

User must perform certain preparation before actual measurement - adjust portable meter **RVD-904** (parameters **TYPE** and **TEMPERATURE** adjustment if necessary) and prepare material for measurement.

Preparation of material imply that two holes must be drilled with suitable tool with the distance of 10cm between them and vertical to material surface. Holes must have sufficient depth so that probes (electrodes) for concrete are placed in homogenous material along entire measurement length. Holes diameter must be appropriate to provide best possible contact of the probes and material (probes must be tightly inserted).

Holes must be thoroughly cleaned of debris before measurement.

If the material is heated during drilling, it must be given enough time to cool down (at least 10 minutes) before moisture measurement.

After preparation of material, connect the probes and moisture meter using special measurement cable provided, and perform moisture measurement following same procedure as used in wood moisture content measurement.

Probe for concrete is shown on following picture:





## 8. APPENDIX - WOOD TYPES TABLE

WOOD SPECIE	TYPE	WOOD SPECIE	TYPE	WOOD SPECIE	TYPE
Abachi	2	Balsa	3	Camphorwood, Borneo	4
Abura	3	Banga Wanga	2	Cedar	3
Acacia	3	Basswood	2	Cedar, Red	3
Afara, White	3	Beech, Chilean	2	Chengal	2
Afromosia	2	Beech, steamed	2	Cherry	3
Agathis	3	Beech, White	3	Chestnut	3
Alder	3	Bintangor	2	Chestnut, American	2
Alder, Red	3	Birch	3	Cypress	3
Ash	3	Blackwood,African	2	Dibetou	4
Ash, American	2	Blackwood,Bombay	2	Durian	3
Atlas	2	Boxwood	2	Ebony	2
Atlas, Nigerian	3	Camphor	3	Elm, American	2
Balau	3	Camphorwood, African	3	Elm, European	3

WOOD SPECIE	TYPE	WOOD SPECIE	TYPE	WOOD SPECIE	TYPE
Eucalypto	3	Jarrah	3	Linden (Lime)	2
Fir	3	Jelutong	3	Locust	3
Geronggang	3	Jong Kong	2	Magnolia	3
Greenheart	2	Juniper	3	Mahogany, African	3
Greenheart, African	3	Kapur	4	Mahogany, Australian	3
Guatambu	3	Karri	3	Mahogany, Sapelli	3
Gum	3	Kasai	3	Mahogany, White	2
Hemlock	3	Kempass	3	Mahogony, Philippines	3
Hickory	2	Keranji	2	Mansonia	2
Hornbeam	2	Keruing	3	Maple	3
Ipe	2	Lapacho	2	Massaranduba	2
Iroko	2	Larch	3	Meranti, Dark Red	3
Ironwood, Burmese	2	Lauan	3	Meranti, Light Red	3
Ivory Wood, Pink	2	Laurel	3	Meranti, Red	3

<b>WOOD SPECIE</b>	<b>TYPE</b>	<b>WOOD SPECIE</b>	<b>TYPE</b>	<b>WOOD SPECIE</b>	<b>TYPE</b>
Meranti, White	<b>3</b>	Padauk, African	<b>2</b>	Sequoia	<b>2</b>
Meranti, Yellow	<b>2</b>	Padauk, Burma	<b>3</b>	Sepetir	<b>3</b>
Merawan	<b>3</b>	Palisander	<b>2</b>	Seraya	<b>3</b>
Merbau	<b>3</b>	Panga Panga	<b>2</b>	Sipo (Utile)	<b>4</b>
Mersawa	<b>2</b>	Pear	<b>2</b>	Spruce	<b>3</b>
Mulberry	<b>3</b>	Pine	<b>3</b>	Teak	<b>2</b>
Niangon	<b>2</b>	Plum	<b>3</b>	Teak, Rhodesian	<b>3</b>
Nyatoh (Balam)	<b>1</b>	Poplar	<b>3</b>	Ulin	<b>2</b>
Oak, European	<b>3</b>	Pyinkado	<b>2</b>	Walnut, African	<b>4</b>
Oak, Japanese	<b>3</b>	Ramin	<b>2</b>	Walnut, European	<b>3</b>
Oak, American Red	<b>2</b>	Redwood, Giant	<b>3</b>	Willow, White	<b>2</b>
Oak, White	<b>2</b>	Rosewood	<b>2</b>	Yew	<b>3</b>
Okume	<b>2</b>	Rubberwood	<b>1</b>	Zebrano	<b>1</b>
Olive Tree	<b>2</b>	Seminai	<b>3</b>		



**RVD - 904**

Universal portable moisture meter

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## 10. APENDIX - CONSTRUCTION MATERIALS MC TABLE

LABEL	TYPE	UNIT SHOWS (MOISTURE WEIGHT PERCENTAGE)
b1	Concrete mortar	
b2	Plaster	
b3	Gypsum	
b15	Concrete, type 15	
b25	Concrete, type 25	
b35	Concrete, type 35	

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