

MC-400

***Fuktkvotsmätare för
Trämateriäl
Moisture Content Meter for Wood***



**BRUKSANVISNING
USER'S MANUAL**

**SWE
ENG**

INTRODUKTION

MC-400 är ett mätinstrument för noggranna mätningar av fuktkvoten i trämaterial och är förprogrammerad med materialkoder för olika träslag, kompensering för materialets temperatur samt testfunktion för att kontrollera fuktkvotsmätarens kalibrering. MC-400 levereras i två versioner komplett med väska:

MC-400A	MC-400B
<ul style="list-style-type: none"> • Mätsond för trä (S-10) • Anslutningskabel 1,2 m • Mätstift för S-10: <ul style="list-style-type: none"> - Stål (mätdjup: 12/19/26 mm) 	<ul style="list-style-type: none"> • Hammarelektrod (S-30) • Anslutningskabel 1,2 m • Mätstift för S-30: <ul style="list-style-type: none"> - Teflonbelagda (mätdjup: 30 mm)

Extra tillbehör:

- S-10 Mätsond
- S-30 Slaghammare
- Mätelektroder för ytmätningar. (Fanér)
- Referensmotstånd

Mätstift för S-10

- Stål (mätdjup: 12/19/26 mm)
- Stål (mätdjup: 56 mm)

Mätstift för S-30

- Teflonbelagda (mätdjup: 45 mm)
- Teflonbelagda (mätdjup: 30 mm)

HANDHAVANDE

1. Anslut sladden från hammarelektroden till mätinstrumentet.
2. Välj typ av virke, vridomkopplare "Wood group" i läge 1 - 4. Se "Tabell - Trägrupper" i slutet av bruksanvisningen.
3. Kompensera för virkets temperatur, vridomkopplare "x 10 °C". (Se även avsnittet för "Temperaturkompensation" nedan).
4. Slå in hammarelektrodens mätstift i virket till det djup på vilket fuktkvoten skall mätas (1/3 av virkets tjocklek är vanligast). Undvik kvistar och ådring.
5. Läs av mätvärdet efter 3 - 5 sekunder.
6. Upprepa punkt 4 och 5 för nya mätpunkter.
7. Ställ vridomkopplaren för materialinställning "Wood group" i läge "0" (Off) när mätningarna har avslutats.

ATT BEAKTA VID MÄTNINGAR

- Mät alltid i flera mätpunkter. Det är osäkert om mätvärdet i en mätpunkt kan representera fuktkvoten i virkets hela volym.
- Kontrollera att stiftlektroden är hela och ordentligt fastskruvade.
- Hammarelektrodens mätstift skall slås in vinkelrätt mot ådringen.
- Undvik att slå mätstiften i kvistar och ådringar.
- Erhållet mätresultat gäller endast för den punkt och på det djup som hammarelektrodens mätstift har slagits in.
- Läs av mätinstrumentet efter 3-5 sekunder.
- Mätinstrument och hammarelektrod skall förvaras i torr miljö (-20 till +60 °C).

TEMPERATURKOMPENSATION

Fukthalten i trä påverkas i hög grad av materialtemperaturen och därför är det viktigt att ställa in temperaturkompensationen genom att ställa vridomkopplaren "x 10 °C" till rätt värde.

Vid temperaturer mellan ovan angivna fasta lägen läses fuktkvoten av vid temperaturen närmast över och under och därefter väljs ett medelvärde.

BATTERIKONTROLL

Om batterispänningen sjunker under normalnivån så kommer, beroende på vilket system som valts, "Low Batt" eller en pil att visas i displayen. Batteriet bör då bytas.

TEKNISK SPECIFIKATION

Mätmetod	Elektrisk resistans
Mätområde:	3 – 100 % fukthalt (H ₂ O)
Display:	LCD digital
Upplösning:	0,1%
Lagringstemperatur	-20 till 60 °C
Batteri:	9 V alkaliskt
Dimension:	145 x 80 x 40 mm
Vikt:	240 g. inkl. batteri
Material, hölje:	ABS-plast
Garanti	1 år

FUNKTIONSKONTROLL MED KALIBRERINGSMOTSTÅND (option)

Det finns två referensmotstånd som tillhör för egenkontroll innan mätning. Normalt behövs ingen justering göras. Vid avvikelse skall instrumentet lämnas in för reparation.

GÖR SÅ HÄR:

- Ställ in instrumentet på 20° C.
- Ställ in trägruppen på nr. 3.
- Sätt in respektive mätmotstånd i mätinstrumentet
- Avläs mätarutslaget och jämför det med det värde som finns angivet på mätmotståndet
- De avlästa värdena bör ej avvika från de värden som finns angivna på kalibreringsblocket med mer än toleransen i tabellen.

Kalibreringsmotstånd	MÄTVÄRDE (MC%)	Tolerans (%)
BLÅTT	18,5	+/- 0,5
RÖTT	8,5	+/- 0,5

INTRODUCTION

MC-400 is a measuring device for accurate measurements of Moisture Content in wood and is programmed for different kinds of wood. The measurement can be temperature compensated. A quick reference guide is mounted on the backside of the meter.

MC-400 is delivered in two versions:

MC-400A	MC-400B
<ul style="list-style-type: none"> Measuring probe for wood (S-10) Connection cable 1,2 m Electrodes for the S-10 probe: <ul style="list-style-type: none"> - Steel (Measuring depth: 12/19/26 mm) 	<ul style="list-style-type: none"> Sliding hammer (S-30) Connection Cable 1,2 m Electrodes for the S-30 probe: <ul style="list-style-type: none"> - Tefloninsulated (measuring depth: 30 mm)

Accessoires:

- S-10 Measuring probe
- S-30 Sliding hammer
- Surface Electrodes for surface measurements
- Reference resistors

Electrodes for S-10
- Steel (: 12/19/26/56 mm)

Electrodes for S-30
- Tefloninsulated (measuring depth: 45 mm)
- Tefloninsulated (measuring depth: 30 mm)

SWITCH THE UNIT ON/OFF

The wood group correction switch is at the same time the ON/OFF-switch (Position "OFF" – unit is switched off).

Once set a wood type, the unit is automatically in operation.

WOOD GROUP SELECTION

To achieve the best possible measurement accuracy use the wood type selector (wood group correcting switch). It should be set to the appropriate wood group before any measurements are taken. The Wood Group Correction Table is found on page 4-6.

As far as the majority of European and exotic timbers are concerned the table indicates which wood group they belong to. For European woods not listed in the table, wood group 3 should be selected.

The optimum setting for types of wood which are new on the market or as yet unknown should be determined by test measurements and oven-dry tests until constant weight is achieved.

TEMPERATURE COMPENSATION

When measuring Moisture Content in wood the accuracy is influenced by the material temperature. Use the temperature compensation knob marked "x 10°C" to set the appropriate wood temperature value. The measured value is automatically corrected when it is displayed.

The MC-400 unit has an automatic electronic calibration function no additional calibration is needed.

It is advisable to check if the electrodes are dirty. The plastic part of the electrode should be cleaned in order to prevent accumulation of surface dirt. Use alcohol as a cleaning agent. Other detergents or solutions may lead to a reduction in insulation.

POWER SUPPLY

The MC-400 is equipped with 9 Volt alkaline block battery. Up to 30.000 measurements can be made with one battery. It is located in battery box on the back of the unit and may be replaced with any commercially available 9 Volt battery of the same size. However, only leak-proof batteries should be used, since if any vapors were to escape they could damage the electronic circuits.

BATTERY CONTROL

To guarantee an excellent consistence of measurements for all built-in stabilizing and compensation circuits,

English name	Group
Moringui	3
Mucarati	2
Muhimbi	2
Muhuhu	2
Mukulungu	2
Mukusi	2
Muninga	3
Musizi	3
Mutenye	3
Myatch	3
Myrtle	3
Niove	2
Nyankom	2
Oak, grape	3
Oak, haft	3
Oak, jap.	3
Oak, red.	3
Oak, stone	3
Obeche	2
Okan	3
Okoume	2
Okwen	3
Olive tree	2
Olivillo	3
Opepe	3
Ovangkol	3
Ozigo	3
Ozouga	2
Padouk, afr.	3
Padouk, Burma-	3
Padouk, Manila-	3
Paldao	3
Parana Pine	1
Partridge	3
Pencil-wood, afr, + virg.	3
Pencil-wood, calif.	3
Pernambuc	3
Persimmon	2
Pillarwood	2
Pine, black + red	3
Pine, Pitch + Insignis	3
Pine, Weymouth- + Stone-	3
Pink Ivory wood	2
Pockholz	2
Podo	3

English name	Group
Ponderosa Pine	3
Port-orfordcedar	3
Purpleheart	3
Pyinkado	2
Quaruba	3
Quebracho blanco	2
Quebracho colorado	2
Ramin	2
Rauli	3
Red peroba	3
Redcedar, western	2
Redwood, calif.	3
Rengas	3
Robinie	3
Roble	3
Safukala	3
Saligna Gum	3
Sandalwood	2
Sapele	2
Sapo	3
Sasswood	2
Satinwood, east-indian	2
Satinwood, west-indian	2
Sen	3
Sepetir	3
Seraya, white + red + yellow	3
Shore-pine	3
Sikon	3
Snake wood	2
Sucamore	3
Sucupira	2
Sugi	3
Sweet-chestnut	3
Sweetgum	3
Tali	2
Tangile	3
Tchitola	3
Teak	2
Thuya-Maser	3
Toosca	3
Tulipwood	2
Tupelo	3
Umbrella-tree	3
Wacapou	2
Wattle, black	2
Wenge	2

English name	Group
West-indian-locust	3
White-afara	3
White-peroba	3
Whitewood	3
Wood-fiber insulating panels	3
Yang	3
Yemane	3
Zapatero	2
Zebrano	1

**FUKTKVOTSMÄTARE/MOISTURE CONTENT METER
WOOD GROUP TABLE**

MC-400



English name	Group
Abura	3
Afcelia	3
African walnut	4
Agathis	3
Agba	3
Akatio	4
Alstonia	3
Amazokoue	3
Amendoim	3
American-mahagony	3
Andiroba	3
Andoung	3
Angelin	3
Angelique	3
Aniegré	4
Aningori	4
Antiaris	3
Ash, americ.	3
Ash, jap.	3
Ash, meanness	3
Assacu	3
Assegai	2
Avodiré	2
Azobé	3
Baboen	3
Bahia	3
Baitoa	3
Balau	3
Balsamo	3
Banga Wanga	3
Basswood	3
Berlinia	3
Birch, meanness	3
Blackwood, afr.	3
Blackwood, austr.	3
Blue Gum	3
Boire	3
Bomax	3
Borneo Camphorwood	3
Box-tree	2
Brasilian-walnut	4
Brazilian-rosewood	2
Brushbox	3
Bruyere	3
Bubinga	4
Cabbage-bark, black	3

English name	Group
Campeche	3
Camphorwood, afr.	3
Camphorwood, real-	3
Canarium, afr.	3
Cativo	3
Cedar, white + red	2
Chengal	3
Chickrassy	3
Chipboard (phenolic resin bonded)	1
Chipboard (urea bonded)	2
Cocobolo	3
Cocuswood	2
Coigue	3
Columbian pine	2
Cypress, southern	2
Dahoma	2
Daniellia	3
Danta	3
Diambi	3
Dogwood	2
Douglasie	2
Douka	3
Ebony, afr. + asiat.	2
Ebony, macassar	2
Esia	3
Eucalyptus	3
European aspen	2
European-plane	3
Evino	3
Eyong	3
Fraké	3
Freijo	2
Gedu Nohor	3
Gerongang	3
Goncalo	2
Gonzales Alves	1
Greenhart	2
Groupie	2
Guarea	3
Guatambu	3
Guaycan	2
Gum-tree	3
Haldu	3
Hardboard	2
Hickory	3

English name	Group
Idigbo	2
Ilomba	3
Indian-rosewood	2
Iroko	2
Izombe	3
Jacareuba	3
Jarrah	2
Jelutong	3
Karri	2
Kauri	3
Kempas	2
Keruing	3
Kokrodua	2
Koto	3
Landa	3
Lauran, white + red	4
Laurel, Chile-	3
Laurel, Indian-	3
Limbali	3
Louro, vermecho	3
Madrono, Pacific	3
Magnolia	3
Mahagony	4
Mahagony, Khaya	2
Mahagony, Kosipo	3
Mahagony, Sapelli	2
Mahagony, Sipo	4
Mahagony, Tiama	3
Makore	3
Manbarklak	3
Manio	3
Mansonia	4
Maple, Mountain-	3
Maple, Soft-	3
Massaranduba	2
Mecrusse	2
Menkulang	3
Meranti, dark red	4
Meranti, light-red	4
Meranti, white	3
Meranti, yellow	3
Merawan	3
Merbau	3
Mersawa	3
Moabi	2
Mora	2

**MOISTURE CONTENTMETER
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it is necessary to prevent battery voltage from falling below the minimum permitted.

For this reason, the MC-400 is equipped with the following control-elements:

- If battery voltage falls below the minimum permitted an early warning system will display "Low Batt.:" or will show – depending on the system chosen – an arrow on left top of the display.

Nevertheless it is still possible to take measurements with undiminished accuracy – approx. a few hundreds more – it is advisable to replace the battery now. This is to avoid a total black-out of the value indication.

REPLACEMENT OF BATTERY

Open the battery box on the back of the unit and replace the battery.

How to use instrument:

1. Connect the probe (S-10 or S-30) to the instrument using the connection cable.
2. Determine what wood specie and select appropriate „Wood Group“ 1 - 4. See "Table - Wood group" in the end of the manual.
3. Set the temperature compensation of the wood with "x 10 °C". (See "Temperature Compensation" below).
4. Insert the electrodes in the timber to the wanted measuring depth (usual 1/3 of the total thickness. Avoid twigs.
5. Read the measurement value after 3-5 seconds.
6. Repeat 4 and 5 for new measurements.
7. Set the "Wood group" knob to "0" (Off) to turn off the meter.

NOTE:

- Always measure several measuring points. It is not certain that a single measurement point is representative for the complete timber volume.
- Check that the electrodes are not bent and securely tightened to the probe.
- The electrodes shall be inserted crosswise the grain.
- Avoid twigs.
- The measuring result is only valid for the measuring point and the penetration depth that electrodes are inserted to.

TEMPERATURE COMPENSATION

The moisture content is affected by the material temperature. It is important to set the appropriate correction value using the knob "x 10 °C". If the temperature is in between the scale settings a measurement is made on the nearest above and one nearest below temperature. The correct value is the mean value of the two measurements.

BATTERY CHECK

If the battery voltage is below normal level "Low Batt" or an arrow is indicated in the display the battery needs to be replaced immediately to ensure correct measurements.

TECHNICAL SPECIFICATIONS

Measuring method:	Electronic resistor
Measuring range wood materials:	3 - 100 % moisture content (H ₂ O)
Display:	LCD digital
Resolution:	0,1%
Power supply:	9 V alkali battery
Storing Temperature	-20 till +60 °C
Dimensions:	145 x 80 x 40 mm
Weight approx.:	240 g. incl. battery
Housing material:	ABS
Warranty:	1 year

CONTROL USING REFERENCE RESISTORS (Option)

There are two reference resistors available as an option. Normally no adjustment is necessary. If the values deviates from the tolerance the instruments needs to be sent for repair.

INSTRUCTION:

- Set the meter to +20° C.
- Set the woodgroup to No. 3.
- Insert the appropriate resistor in the instrument.
- Compare the reading with the value and tolerance in the table below.
- The value should not deviate more than the defined tolerance.

Reference resistor	Measurement value (MC %)	Tolerance (%)
BLUE	18,5	+/- 0,5
RED	8,5	+/- 0,5

TABELL/QUICK REFERENCE

Svenskt namn	English name	Latin Name	Group
Al	Alder	Alnus glutinosa	3
Alm	Elm, Wych	Ulmus glabra	3
Ask	Ash	Fraxinus excelsior	3
Asp	Aspen	Populus tremula	3
Avenbok, Vitbok, annbok	Hornbeam	Carpinus betulus	3
Balsa	Balsa		3
Björk, Värtbjörk	Birch, Silver	Betula Pendula Roth	3
Bok, vanlig. Rödbok	Beech	Fagus Sylvatica	2
Cypress	Cypresse		3
Ek	Oak	Quercus robur	3
Ek, Vit-	Oak, white	Quercus alba	3
En	Juniper	Juniperus communis	3
Furu	Scot's Pine	Pinus sylvestris	3
Gran	Fir tree	Picea abies	3
Gran	Spruce, Norway	Picea abies	4
Gul Björk	Birch, yellow	Betula alleghaniensis	3
Hemlock	Hemlock	Tsuga canadensis	3
Hästkastanj, vanlig	Horse-chestnut	Aesculus hippocastanum	3
Idegran	Yew	Taxus baccata	3
Körsbärsträd	Cherry		3
Lind	Lime	Tilia cordata	3
Lärk	Larch, europ.	Larix decidua	3
Lärk, Japansk	Larch, jap.	Larix kaempferi (Lamb.) Carrière	3
Lärk, Sibirisk	Larch, sibir.	Larix sibirica Ledeb.	3
Lönn	Maple, Norwegian	Acer platanoides	3
Pil	Willow		3
Plommon	Plum-tree	Prunus domestica	3
Päron	Pear	Pyrus communis	2
Socketlönn	Maple, sugar-	Acer saccharum	3
Tall	Scot's Pine	Pinus sylvestris	3
Valnöt	Walnut, americ.	Juglans regia	3
Vitgran	Spruce Western White	Picea glauca	3