CE

GANN HYDROMETTE HB 30

Operating Instructions





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Technical Specifications - Hydromette HB 30

(1)	BNC Connection Socket	for connection of electrodes designed for testing wood and set building materials
(2) 60	7-pin Connection Socket	for connection of the active electrodes MB 35, B 50, B
		and IR 40
(3)	LCD Readout	for all measurements
(4)	Selector Switch	»position 2 and 3«
		for automatic correction of readings according to the species of wood to be measured (see separate table of wood species)
		»position B«
the		for measurement of set building materials according to
		resistance measuring method
		»position M«
		for measurements using the active electrodes B 50, B 60, MB 35 and IR 40.
		»position Batt«
		for battery check.
(5)	Measuring Key	ON/OFF

Measuring ranges

Wood Moisture, position »2-3«:	4 - 30 % m.c.	
Structural Moisture 1, position »B«: ing	0 - 80 digits	with graphs for convert-
		readings into percent of moisture for various building materials
Structural Moisture 2, position »M«:	0 - 199 digits	non-destructive measurement with active electrode B 50 or B 60
	0.3 - 8.5 %	of dry weight non-
destructive		measurement with active electrode B 50 and B 60 by conversion table
and	0.3 - 6.5 % CM	non-destructive measurement with active electrode B 50
and		B 60 by conversion table
	2 - 8 %	of dry weight with active electrode MB 35, non- destructive surface measure- ment of concrete

Temperature, position »M«:

If the measured value exceeds the measuring capacity, the figure »1« appears on the left side of the display screen (3).

Battery Check

Set selector switch (4) to position »Batt« and press measuring key (5). The reading displayed should be higher than 7.5 digits. If it is 7.5 digits or lower, the battery is exhausted and should be replaced or recharged if a rechargeable battery is being used. The cover of the battery compartment can be lifted by means of a coin inserted into the slot.

It is recommendable to replace or recharge the battery once the reading of the battery check is between 8.0 and 7.5 digits.

Power Source

The meter is fitted, as standard, with a 9 V dry battery IEC 6 F 22 or IEC 6 LF 22. It is recommended to use alkali-mangan batteries.

A rechargeable nickel-cadmium battery can be fitted (optional accessory). It can be recharged from any A.C. lighting supply socket by means of the charging unit supplied with this special battery.

Calibration

The meter is fitted with an electronic setting device, making manual calibration or adjustment unnecessary.

Dimensions

Plastic casing: Length 140 mm x Width 90 mm x Height 42/50 mm. Weight: about 230 g without accessory.

Admissible ambient temperatures

Storage:5 to 40 °C; temporarily -10 to 60 °C not condensingOperation:0 to 50 °C, short term-10 to 60 °C not condensing

The meter including accessory must not be stored or used in aggressive air or air contaminated by solvents.



The instructions for use of the meter and of the electrodes should be carefully observed to avoid measuring errors which may occur when trying to simplify the measuring procedure.

Important Safety Directions and General Remarks

The following instructions should be carefully read and understood prior to first use of the moisture meter. No warranty claim can be accepted for any damage caused by non-observance of these instructions. The manufacturer can also not assume any responsibility for incidental or consequential damages.

The instructions for use of the meter and of the electrodes should be carefully observed to avoid measuring errors which may occur when trying to simplify the measuring procedure.



Make sure in any case *prior to* drilling holes for measuring probes or *before* driving electrode pins into walls, ceilings or floors that this happens away from power lines, water pipings or other supply pipes.

Using the moisture meter under unfavourable environment conditions should be avoided as this could result in damages to the sensitive electronic circuitry of the meter itself or to the measuring sensors.

Unfavourable environment conditions are among other things constantly too high an ambient air humidity (>90 % R.H.), dust and inflammable gases or vapours as well as air containing solvents, ambient temperatures exceeding 50 °C, ambient temperatures below the freezing point, ambient temperature dropping below dew point (formation of condensate).

When using the measuring probes and connecting to or disconnecting them from the measuring instrument do not use force and do not pull on the cable.

The measuring instrument, connecting cable and measuring probes must not be used or stored in aggressive or air containing solvents.

Static Electricity - At low air humidity circumstances such as friction during timber handling or highly insulated surroundings may cause static electricity of very high voltages. This may result not only in fluctuating or negative readings, but can also destroy transistors and ICs used in manufacturing the moisture meter.

The operator too may contribute by his clothing or shoes made of man-made fibre to build up a static charge. The results can markedly improved, if the operator stands perfectly still and avoids moving the meter and the measuring cable while taking the reading.

Frozen wood with moisture content in excess of 20 % cannot be measured.

The information and tables on admissible or usual moisture conditions as well as the general terms and definitions contained in the instructions were taken from the specialist literature. The manufacturer or supplier of the measuring instrument cannot be held responsible for the correctness of this information.

The conclusions to be drawn from the measurement results by each user are governed by the individual circumstances and experiences and knowledge gained in the course of his professional practice.

The measuring instrument meets the stronger demands laid down in class B of the pertinent regulations for interference emission and may, therefore, be used also in living areas.

The measuring instrument and its standard and optional accessory must only be used as described in this manual.

In view of the electromagnetic compatibility and the reliability of measurement, only the standard and optional accessory described in this manual must be used with the measuring instrument.

Operating Instructions for Wood Moisture Measurement

using measuring electrodes M 18, M 20, and M 20-OF 15

Set selector switch (4) to position (2 or 3) stated in the table of wood species for the species to be tested. Only species classified in group 2 and 3 can accurately be measured.

Connect measuring electrode to the meter socket (1) by means of the measuring cable MK 8.

Drive-in, stick-in or press the electrode onto the wood to be measured.

Press measuring key (5) and read off result displayed by the LCD readout as soon as the reading has stabilised. Press measuring key no more than three seconds.

Compensation of the influence of the wood temperature

The reading displayed refers to a wood temperature of 20 °C. For higher or lower temperatures correct readings according to the table below:

		8 %	10 %	12 %	14 %	16 %	20 %	25 %	30 %
0	°C	10.5	13.0	15.0	17.5	19.5	24.5	30.0	35.5
5	°C	9.5	12.0	14.0	16.5	18.5	23.0	28.5	34.0
10	°C	9.0	11.5	13.0	15.5	17.5	22.0	27.0	32.5
15	°C	8.5	10.5	12.5	14.5	16.5	21.0	26.0	31.0
20	°C	8.0	10.0	12.0	14.0	16.0	20.0	25.0	30.0
25	°C	7.5	9.5	11.5	13.5	15.5	19.0	24.0	29.0
30	°C	7.0	9.0	10.5	12.5	14.5	18.0	23.0	27.5
35	°C	6.5	8.5	10.0	12.0	14.0	17.5	22.0	26.5
40	°C	6.0	8.0	9.5	11.5	13.0	16.5	21.0	25.5

Reading

actual wood moisture content in %

Handling of the Electrodes for Wood Moisture Measurement

Connection of the Electrodes

The meter can be used with different types of measuring electrodes according to the individual application. The electrodes M 6, M 18, M 20, and M 20-HW are connected to the meter socket (1) by means of the measuring cable MK 8. On the meter side, this cable is fitted with a BNC plug. Turn clockwise to lock it. To disconnect, turn notched fastening ring anticlockwise. **Do not use force and do not pull on the cable.**

Grain Direction

GANN wood moisture meters have been calibrated for taking readings with electrode pins driven into the test sample across the grain. As the electrical resistance is greater across the grain than parallel to the grain, too high a reading will be obtained if the electrode pins of GANN meters are applied parallel to the grain. The effect can be neglected at readings below 10 % m.c., whereas around 20 % m.c. the meter will read about 2 % m.c. higher.

Thickness of Wood

Electrode with pins having a penetration of 10 mm can be used on wood up to 30 to 40 mm thick, whereas pins with a penetration of 17 mm are designed for wood thicknesses between 50 and 65 mm. For thicker boards or planks, the ram-in electrode M 18 should be used which permits the use of pins with a penetration depth up to 54 mm.

For stock with uniform moisture content, non-insulated pins can be used, whereas for all other applications insulated pins making contact only with their uncoated tip having a uniform contact area with the wood, regardless of the penetration depth, should be used. Any change in meter readings taken with insulated pins at different penetration depths clearly reflect an actual change in moisture content representing the existing moisture gradient.

Drive-in Electrode M 20

Drive the electrode into the wood with the needles across the grain (the electrode body is made of impact-resistant plastic). When withdrawing the electrode, the pins can be loosened by slight sideways rocking movements across the grain.

For determining the average moisture content, the pins have to be driven to a depth of approx. 1/4 to 1/3 of wood thickness.

When the M 20 electrode is supplied with the meter as initial equipment, 10 spare pins 16 and 23 mm long are included in the delivery. They are suitable for testing wood up to 30 mm and 50 mm thick respectively.

If thicker boards or planks are to be measured, the needles can be replaced by longer ones. Naturally, the liability to breakage and/or bending increases with the length of the pins, especially when withdrawing them. Therefore, it is recommended to use the ram-in electrode M 18 for testing thicker wood.

The cap nuts should be tightened by means of a spanner. Loose needles may easily break.

Surface Electrodes M 20-OF 15

Surface measurements should only be taken when the wood moisture content is below 30 % m.c. For surface measurements on already machined stock, the two hexagon cap nuts have to be unscrewed and replaced with the surface measuring caps. For measurement, the two contact pads have to be pressed across the grain onto the stock to be measured. The measuring depth is about 3 mm, so when testing thinner stock several boards have to be laid on top of one another for measurement. *Do not measure thin boards on metal bases.*

Wood particles adhering to the measuring surface should be removed at regular intervals. If the flexible plastic pads are damaged, new ones can be ordered *(Ref. No. 4316)* and stuck on using a commercially available instant adhesive on cyanate basis.

Ram-in Electrode M 18

The two needles of the ram-in electrode have to be driven to the required measuring depth, across the grain, using the sliding hammer. For determining the average moisture content, the same measuring depth as described with electrode M 20 is required.



The pins must not be driven into the wood until the cap nuts are in touch with the wood to be measured to avoid a possible damage to the electrode. Stop hammering when the gap between the cap nuts and the wood is still about 5 mm.

The needles are withdrawn by striking upwards with the sliding hammer. Prior to a series of measurements, the cap nuts should be tightened by means of a spanner. Loose needles may easily break.

When the M 18 electrode is supplied with the meter, 10 spare pins 40 mm and 60 mm long (without insulated shank) are included in the delivery. They are suitable for measuring wood up to 120 mm and 180 mm thick respectively. For testing timber with higher shell m.c. than core m.c., e.g. if boards were exposed to rain, electrode pins with insulated shank should be used. They are available in packets of 10 pins and in lengths of 45 mm (*Ref. No. 4550*) and 60 mm (*Ref. No. 4500*).

Test Standard for Wood Moisture Measuring Curcuit

The test standard *(Ref. No. 6070)* permits to check the meter as well as the connection cable and the measuring electrodes M 18 and M 20 both in respect to proper function and accurate readings.

To do so, connect the cable to the meter and insert the two plugs of the cable into the bushings of the test standard. If the measuring electrode is to be included in the check, connect electrode to the cable and insert the two electrode pins into the bushing of the test standard.

Set wood species selector (4), contrary to the indication on the test standard, to position 3 and press measuring key (5). The meter should read 18.1 %. The admissible tolerance is \pm 0.5 %. The meter and the test standard should have a temperature of about 20 °C.

Effects of Wood Preservers

Treatment of wood with organic preservers or impregnating agents have, in general, little effect on the meter readings. Treatment with preservatives containing salts or other inorganic constituents that change the conductivity of wood, however, has a great effect on the accuracy of the readings and as it is erratic, a suitable table correction cannot be provided.

Moisture Checks on Plywood

Some of the various types of glue used in the manufacture of plywood have a lower electrical resistance than the wood. This will affect the accuracy of electrical resistance moisture meters when the electrode pins get in touch with a glue line. The meter will then show too high a moisture content.

To find out whether a conductive glue has been used in manufacturing the plywood to be tested, drive the electrode pins to a depth of no more than half the thickness of the first ply and read the result. Then drive the pins further into the plywood until they come in contact with the first glue line. If the reading now displayed is not noticeable higher than before, the glue may be considered to have no effect on the accuracy of the meter readings.

Static Electricity

At wood moisture contents below 10 %, circumstances such as low air relative humidity, friction during timber handling or highly insulated surroundings may cause static electricity of very high voltages. The operator too may contribute, e.g. by his clothing or shoes made of man-made fibre, to build up a static charge. This may result not only in fluctuating or negative readings, but can also destroy transistors and integrated circuits used in manufacturing the moisture meter.

The results can be markedly improved, if the operator stands perfectly still and avoids moving the meter and the measuring cable while taking the reading.

Especially at the outlet of veneer dryers, very high static charges have to be expected. Therefore, moisture measurements of dried veneer should be made only after the static charge has been sufficiently reduced, what can be sped up by employing suitable grounding measures.

Wood Moisture Equilibrium - Equilibrium Moisture Content

When storing wood for a sufficiently long space of time in a constant ambient atmosphere, it will adopt the moisture content that corresponds to this climate which is called **Wood Mois-ture Equilibrium**.

Once the wood has reached its moisture equilibrium, it will neither give off moisture nor absorb it from the air, unless the ambient atmosphere changes. The following table shows some moisture equilibrium values which wood adopts at the various conditions specified.

	Wood Moisture Equilibrium											
	Air Temperature in °C											
	10°	15°	20°	25°	30°							
Air relative humidity		Wood Moistu	ire Content									
20%	4,7%	4,7%	4,6%	4,4%	4,3%							
30%	6,3%	6,2%	6,1%	6,0%	5,9%							
40%	7,9%	7,8%	7,7%	7,5%	7,5%							
50%	9,4%	9,3%	9,2%	9,0%	9,0%							
60%	11,1%	11,0%	10,8%	10,6%	10,5%							
70%	13,3%	13,2%	13,0%	12,8%	12,6%							

80%	16,2%	16,3%	16,0%	15,8%	15,6%
90%	21,2%	21,2%	20,6%	20,3%	20,1%

Operating instructions for moisture measurement of building materials according to the resistance method

Set selector switch (4) to position »B«.

Connect selected measuring electrode to the meter socket (1) by means of the measuring cable MK 8 and press or stick electrode pins into the material to be measured.

Press measuring key (5) and read off result displayed by the LCD readout (3) in digits.

Convert reading into per cent of moisture by means of scale graphs listed at the end of this section.

Connection of the Electrodes

Different electrodes can be used with the meter depending on the material to be tested. The electrodes are connected to the meter socket (1) by means of the measuring cable MK 8.

On the meter side, this cable is fitted with a BNC plug. Turn clockwise to lock it. To disconnect,

turn notched fastening ring anti-clock- wise and draw off plug.

Do not use force and do not pull on the cable.

Testing Set Building Materials

For testing soft building materials, the drive-in electrode M 20 should be used, whereas hard building materials such as concrete and cement flooring are to be measured with the stick-in electrodes M 6 or M 21/100, using contact paste.

For penetration measurements, up to a depth of 250 mm, on concrete or masonry, the special electrodes M 21/250 are available.

Special measurement caps type M 20-OF 15 are available for surface measurements (e.g. on concrete, etc.). They can be used only in conjunction with the electrode M 20.

Drive-in Electrode M 20

For penetration measurements, up to a depth of 70 mm, on soft, set building materials (gypsum, plaster, etc.), drive electrode pins into the material to be tested (the electrode body is of impact resistant plastic). Take care that both pins of the electrode are driven only into the material to be tested.

When withdrawing the electrode, the pins can be loosened by slight sideways rocking movements. The cap nuts should be tightened by means of a spanner prior to a series of measurements. Loose pins may easily break.

When the meter is supplied with the M 20 electrode as initial equipment, 10 spare pins 16 and 23 mm long (commercial steel nails) are included in the delivery. They can be used for measurements up to a depth of 20 mm or 30 mm respectively. For measurements to greater depths, the stick-in electrodes M 6 should be used which are supplied with pins 40 mm and 60 mm long.

Surface Measurement Caps M 20-OF 15

For surface measurements on smooth materials, the two hexagonal union nuts of the drive-in electrode have to be unscrewed and replaced by the surface measurement caps. To perform the measurement, the two contact surfaces should be firmly pressed onto the material being measured. The measurement depth is about 3 mm. Particles adhering to the measurement surface should be regularly removed. If the elastic plastic pads should once be damaged, they can be re-ordered and stuck on using a commercially available instant adhesive on cyanate basis.

Measuring errors can be caused by a contaminated or dirty surface (e.g. oil).

Stick-in Electrode M 6

The two electrodes exclusively designed for moisture checks on set building materials are pressed, at approx. 10 cm apart, into the material to be tested. Both electrodes have to be inserted into the same type of building material. Also, the section to be measured must be coherent and not be crossed by any other material. If the material is too hard to press in the electrodes by hand

(e.g. cement flooring, concrete, etc.) drill 6 mm holes and fill them with contact paste to full depth. Then stick the pins into the contact paste.

When the meter is supplied with the M 6 stick-in electrodes as initial equipment, two pins 23 mm, 40 mm and 60 mm long are included in the delivery. They are suitable for measurements in depths up to 30 mm, 50 mm or 70 mm respectively.

Where hard building materials are involved and no contact paste is used, a considerable measuring error must be expected (the values indicated will be too low).

Brush Electrodes M 25

The two brush electrodes, made of stainless steel, are specially designed for depth measurements on hard and soft building materials *without using additionally contact paste.* To do so, drill two blind holes approx. 5 - 8 cm apart and with a diameter of 6 mm. To ensure sufficient contact, the blind holes must be drilled to a depth of at least 2 cm. Make sure that both electrodes are inserted in the same, coherent material. When testing cement flooring, the blind holes should be drilled to 75 % of the overall thickness of the cement flooring.

To ensure a long life, turn the electrodes always clockwise when inserting or withdrawing them. Be careful when using pliers or similar tools.

Deep Electrode M 21-100/250

These two electrodes, exclusively designed for the measurement of set building materials, allow a measuring depth of up to 100 mm or 250 mm respectively. Insulated sleeves prevent the results from being distorted by a high degree of surface moisture such as dew or rain.

Drill two 8 or 10 mm dia. blind holes approx. 10 cm apart (the section to be measured must be coherent and consist of the same material).

It is very important that a sharp drill is used at low speed. Where a lot of heat is generated in the hole, it is necessary to wait at least 10 minutes before introducing the electrodes or contact paste. Insert the tube point 30 mm vertically into the contact paste in order to fill it with paste. Clean the outside of the electrode tube right to the point and insert into blind hole.

Prepare the second hole in the same way. Connect measuring cable to the electrode rod and insert the latter into the electrode tube. Press the contact paste to the end of the hole by exerting pressure with the rod. Connect the measuring cable to the meter, press measuring key and read off result.



The readings may under some circumstances be distorted if there is too much contact material in the electrode tube or if an electrode tube contaminated with contact paste is repeatedly removed and inserted.

Contact Paste

The contact paste is supplied in quantities of approx. 450 g in a plastic box sealed with a screw cap. It is used to produce a good contact between the electrode point and the building material to be measured or to serve as an extension to the electrode point. The moisture displaced by the drilling process is reconducted to the material to be measured by the water contained in the highly conductive contact paste.

The surface of the material to be measured must not be smeared with the contact paste as the latter has a high conductivity. When using the M 6 electrodes, it is advisable for an appropriate amount of the paste to be rolled into a thin strand and pressed into the hole with the reverse end of the drill.

It is possible to keep the contact paste mouldable by adding normal tap water. The quantity contained in a box is generally sufficient for approx. 50 measurements.

Flat Electrode M 6-Bi 200/300

These two electrodes are exclusively designed for measurement of insulating material through the edge joint of the cement flooring. Spaced about 5 to 10 cm, they have to be pushed forward through the edge joint along the cement flooring down to the insulating layer. Particular care should be taken to avoid that the shrinking hose of the pins is not damaged because otherwise a moist cement flooring can cause measuring errors. The cap nuts should be tightened by means of a spanner or pliers.

The two flat electrodes can only be used with the M 6 electrode handle.

Stick-in Electrodes M 6 - 150/250

The very thin electrode pins are specially designed for testing building or insulating materials for moisture content, if the pin holes shall be kept as small as possible. The two 2 mm dia. pins, made of ductile high-grade steel, can, for example, be sticked approx. 3 to 5 cm apart through the edge joint to the cement flooring into the insulating layer.

For use of these pins being specially developed for measurements through the cross joint of tiles, a special 3 mm dia. hard-metal drill 160 mm long *(Ref. No. 6078)* is available. It permits drilling a hole through the cement flooring up to the insulating layer. The electrode pins should be spaced, if possible, no more than 10 cm (maximum 15 cm).

The electrode pins can be used with the handles of the M 6 electrodes (*Ref. No. 3700*) and with the M 20 electrode (*Ref. No. 3300*).

Test Standard for Structural Moisture Measuring Section

The optionally available test standard *(Ref. No.6071)* permits the user to check proper function of the structural moisture measuring section of the meter as well as of the connecting cable MK 8 and of the measuring electrodes M 6 and M 20 at any time.

To do so, connect the cable to the meter and insert the two plugs in the bushings of the test adapter. If an electrode is to be included in the check, connect it to the cable and insert the two pins into the bushings.

Set selector switch (4) to position »B« and press measuring key (5) when a reading of 45 digits should be obtained. A tolerance of ± 2 digits is admissible.

Equilibrium Moisture Content

What are generally referred to as equilibrium moisture value relates to an ambient temperature of 20 °C and an ambient air humidity of 65 % R.H. These values are frequently also termed *»air dry*«. They must not however be confused with the values at which the material can be processed or worked.

Before laying a floor, the diffusion capacity of the covering and future ambient conditions in the room must be taken into consideration. When laying PVC flooring in a centrally heated

room with an anhydrite subfloor, the PVC floor cannot be laid until the subfloor has dried to approx. 0.5 % m.c.

On the other hand, parquetry flooring can be laid on a cement floor in a room with normal stove heating, with a moisture range of 2.5 to 3.0 % m.c.

It is of prime importance to consider ambient conditions when determining the moisture content of a building material. All materials are exposed to constantly changing temperatures and air humidities. The effect on the moisture content of the material basically depends on the thermal conductivity, heat capacity, resistance to diffusion of water vapour and the hygroscopic properties of the material. The »desired« moisture content of a material, therefore, corresponds to its mean equilibrium moisture under the changing ambient conditions which the material is constantly exposed to.

Air humidity values for Central Europe lie in the range of approx. 45 to 65 % R.H. in summer and approx. 30 to 45 % in winter. A lot of damage occurs in winter, particularly in centrally heated rooms, as a result of these great swings.

It is not possible to define universally valid values. It always requires the craftsman's and the expert's experience to draw correct conclusions from any readings.

For inorganic building materials, the water content is generally defined as a percentage of dry weight. The hygroscopic water content of any material is to a large extent proportional to its density, i.e. for all apparent densities of a building material, the same value is shown when giving the moisture in percentage of dry weight, but at twice the apparent density, a reading in percentage of volume would be twice as great.

Comparison Graph



Air relative humidity % R.H.

0	10	20	30	40	50	60	70	80	90	100
	dry		nc	ormal					m	oist
Woo	d mois	sture								
(con	ifers)	%	6	8	10	12	2 14	16 18	3 20	25 30
Ceme	ent flo	oring	%	1.5		2	2.5		3	
Lime	morta	ar%			0.3		0.5	1	2	
Fung	jus ati	tack								
Outd	oor hu	midity	conditio	ns						
Indoo	or humi	idity co	nditions]		
Centra	l heated	rooms [

Equilibrium Moisture Values in Per Cent of Dry Weight

Building Materials	at 20 °C and	at 20 °C and	at 20 °C and
	50 % R.H.	65 % R.H.	90 % R.H.
	approx.	approx.	approx.
Cement flooring (compressed, laid relatively dry) Cement flooring (not compressed,	1.5	1.7 – 1.8	3.1

laid relatively wet)	2.0	2.4 - 2.6	3.8
Cement mortar 1 : 3	1.5	1.7 – 1.8	3.2
Lime mortar 1 : 3	1.6	1.8 – 1.9	3.4
Gypsum plaster, gypsum boards	0.5	0.6 - 0.7	1.0
Plaster flooring	0.6	0.8 - 0.9	1.3
Magnesite flooring	7.0	8.3 - 8.7	13.0
Stone-wood flooring acc. to DIN	11.0	13.5 – 14.5	16.7
Aerated concrete (Hebel)	8.5	11.0 – 12.0	18.0
Elastizell flooring	1.6	1.8 – 2.2	2.8
Anhydrite flooring	0.5	0.6 – 0.7	0.9
Concrete (200 kg cement / cbm sand)	1.4	1.6 – 1.7	3.0
Concrete (350 kg cement / cbm sand)	1.6	1.8 – 2.0	3.4
Concrete (500 kg cement / cbm sand)	1.8	2.0 – 2.2	3.8

Equilibrium moisture values

The moisture ranges shown in the graphs have the following meaning:



Condition of material	dry	equalizing range	moist
White section:	dry	equilibrium	n moisture attained
White-black section:	equilibrating pha	ase Caution : F ii s	Floor covering or glues mpervious to moisture should not yet been processed
Black section:	moist	Performin avoided	g any work should be

It should be noticed that a state of complete moisture equilibrium is usually achieved only after 1 -3 years. Vapour barriers and long term ambient humidity are decisive factors.









Cement flooring

without additives except setting accelerator Reading m.c. in % of 1,5 2,5 dry weight CM-% **Cement flooring** with addition of synthetics Reading m.c. in % of 2,5 dry weight CM-% **Cement flooring** with addition of bitumen Reading m.c. in % of 3,5 4,5 dry weight CM-%





Instructions For Non-Destructive Measurement of Structural Moisture Using the Active Electrodes MB 35, B 50 and B 60

Set selector switch (4) to position »M«. Connect electrode to meter socket (2) and apply it as described hereinafter. Press measuring key (5) and read result displayed by LCD readout (3).

Active Electrode MB 35

The active electrode MB 35 has specially been developed for surface moisture measurement on concrete and sub-floorings and are suitable particularly for moisture checks prior to coating or gluing.

The measuring range extends from 2.0 to 8.0 % of dry weight (according to oven test). The reading is displayed direct in per cent of moisture.

The electrode is fitted, as standard equipment, with the surface measuring caps M 20-OF 15 with elastic contact pads of conductive plastic material. The pads are glued on their support which in turn are screwed on the electrode handle. Make sure that the measuring caps are properly screwed down. Exchange the elastic measuring pads in case of wear or damage. Fix the new pads on the support plate by means of a commercially available instant adhesive on cyanate basis.

Use of active electrode MB 35

Connect electrode to the meter and press the measuring pads firmly on the concrete. Press measuring key and read off result in per cent of dry weight. The surface of the concrete should be cleaned from dust and separating agents or other contaminations to ensure correct measuring results. Measurements should be taken only after lapse of about 48 hours, if dehumidifiers or hot air blowers have been used to speed up the drying process.

The readings displayed in per cent of dry weight can be converted into CM values according to the following table:

% of dry wei	ight 2.0	3.0	4.0	5.0)	6.0	7.0	8.0
% CM	0.4	1.2	2.0	2.8	3.6	4.5	5.5	

Test Standard for Active Electrode MB 35

The optionally available test standard *(Ref. No. 6073)* permits the user to check the meter and the active electrode MB 35. To do so, connect the electrode to the meter and press its plastic pads onto the metal disks of the test standard.

Then set selector switch (4) to position »M« and press measuring key (5). The reading should be 5.1 digits. A deviation of \pm 0.3 digits is allowed.

Active Electrodes B 50 and B 60

The active electrodes B 50 and B 60 are dielectric moisture sensors with integrated circuitry. They are intended specifically for determining moisture absorption and moisture distribution in building materials such as for example brickwork, concrete, screed, wood, insulating materials, etc.

The basis of measurement is the dielectric constant measurement method. Between the ball electrode and the material to be measured with which it comes into contact, a measurement field is set up, which is affected by the density of the building material to be measured and its moisture content. If the density of the material is constant, changes in the capacity field can be matched to a change in the moisture content of the material being measured.

The measuring range extends from 0 to 199 digits, i.e. the displayed values are relative values. They indicate the distinction between dry and moist building material. The higher the measured value, the higher the moisture content of the material being measured. Drawing conclusions about the actual moisture content in per cent of dry weight or in CM values is only permissible in the case of a normal drying process.

The bulk density of the building material to be measured is in this case a factor of influence which has to be taken into account. High bulk densities lead to higher readings, irrespective of the moisture content.

Use of active electrodes B 50 and B 60

In order to avoid influencing of the measurement result by the hand of the operator, the electrode should only be held by its lower half during checking and measurement. The upper half of the electrode must remain free.

Special feature of the active electrode B 60

The active electrode B 60 is equipped with a selector switch to set a limit value. It allows in conjunction with the also incorporated acoustic signal generator judgement of the tested building material without direct sight on the LCD readout.

Whenever the reading exceeds the preset limit value, a whistle signal sounds.

In the range between 30 and 70 digits, the signal tolerance is \pm 2 digits, and in the range between 80 and 140 digits \pm 3 digits.

Density **Corresponding Relative Air Humidity** (specific wt. of the build-30 _____ 50 _____ 70 _____ 80 _____ 90 _____ 95 _____ 100 ing material) **Display in Digits** kg / m³ very normal semi very dry dry moist dry moist wet up to 600 10 - 20 20 - 40 40 - 60 60 - 90 90 - 110 more than 100 600 -1200 20 - 30 70 - 100 30 - 50 50 - 70 100 - 120 more than 120 1200 - 1800 20 - 40 40 - 60 60 - 80 80 - 100 110 - 130 more than 130 above 1800 90 - 120 30 - 50 50 - 70 70 - 90 120 - 140 more than 140

Display Values (Digits) in Relation to the Material Bilk Density

Display (Digits)	40	50	60	70	80	90	100	110	120	130
Cement	% of dry	1.8	2.2	2.7	3.2	3.6	4.1	4.5	5.0	5.5	5.9
mortar	weight										
ditto	% CM	0.7	1.0	1.4	1.8	2.1	2.5	2.9	3.2	3.6	4.0
Anhydrite	% of dry	0.1	0.3	0.6	1.0	1.4	1.8	2.2	2.5	2.9	3.3
screed	weight										
ditto	% CM	0.1	0.3	0.6	1.0	1.4	1.8	2.2	2.5	2.9	3.3
Concrete B	% of dry		1.3	1.9	2.5	3.2	3.8	4.4	5.0	5.6	6.2
15, B 25, B 35	weight										
ditto	% CM		0.3	0.8	1.3	1.7	2.2	2.7	3.2	3.7	4.2
Cement	% of dry	1.8	2.7	3.5	4.6	6.0	7.0	7.8			
mortar	weight										
ditto	% CM	0.6	1.5	2.3	3.1	4.0	4.8	5.6			
Lime	% of dry	0.6	2.0	3.3	4.5						
mortar	weight										
ditto	% CM	0.6	2.0	3.3	4.5						
Lime-cement	% of dry	2.2	3.6	5.0	6.4	7.8	9.2	10.6	11.0		
plaster mixture	weight										
ditto	% ČM	1.5	2.7	4.0	5.2	6.4	7.6	8.8	10.0		
Gypsum	% of dry	0.3	0.5	1.0	2.0	3.5	6.5	10.0			
plaster	weight										
ditto	% ČM	0.3	0.5	1.0	2.0	3.5	6.5	10.0			

Display Values (Digits) in Percents of Weight

The values in per cent of dry weight or in CM-% stated in the table overleaf are guide values. They refer to a normal drying progress and the usual moisture gradient between surface and the possible measuring depth which depends on the density of the material tested. If the building material dries too fast, e.g. by hot air, dehumidifier, floor heating, etc., the readings may be too low because of the reduced surface moisture.

The measuring depth depends in the main on the respective density of the building material and the surface moisture. The table values are based on the usual thickness of the cement flooring or plaster.

The references and tables concerning permissible or customary moisture conditions in



practice being contained in these Operating Instructions and the general definitions have been taken from the specialist literature. No guaranty for correctness can there-fore be given. The conclusions each user may draw for his own purposes from the measurement results are based on the individual circumstances and the knowledge he

has gained from his professional activities.

Instructions for Temperature Measurement with Active Electrode IR 40

Set selector switch (4) to position »M«.

Connect temperature probe to meter socket (2).

Adjust temperature probe to the desired measuring spot and press measuring key (5).

Read off result in °C.

Technical Specifications

Measuring range:	-20 °C to +199.9 °C. <i>Resolution:</i> 0.1 °C.
Emission factor:	95 %, permanently set.
Dimensions:	Length 185 mm x 36 mm x 33 mm. Coiled cable 320/1200 mm long.

Admissible ambient conditions

Storage: 5 °C to 40 °C; 80 % R.H. maximum, not condensing **Operation:**

0 °C to 50 °C; 90 % R.H. maximum, not condensing.

General Information Concerning Infra-Red Temperature Measurement Technique

All bodies with a temperature above the »absolute zero« (= 0 °K or -273 °C) emit infra-red radiation, also known as thermal radiation. The intensity of this thermal radiation serves as an indication of the surface temperature, having regard to the degree of emission. The infra-red measurement head receives the emitted thermal radiation in a contactless manner and converts it into a voltage signal. This signal is converted in the display device into the measurement unit »Degrees Centigrade«.

Advantages over contact measurement

- □ Very quick response and measurement time
- □ No removal of heat from the measurement object
- □ No damage or contamination of the measurement surface
- □ Measurement of electrically live or moving parts.

Measure

Turn selector switch (4) to position »M«. Insert the plug of the connection cable into the socket (2) and engage by gently turning clockwise. Follow the reverse procedure to remove the plug. **Do not apply force and do not stretch the cable**.

Immediately after pressing the measuring key, the reading is displayed in °C. Depending on the temperature »jump«, the measurement value is instantly displayed or within a few seconds. Fluctuations in the last display digit (1/10 °C) in the range \pm 0.2 °C are completely normal. Even the second digit (1 °C) may jump backwards and forwards on account of the sensitivity of the sensor and its extremely quick reactivity. The damping of the display was intentionally omitted.



During the measurement the measuring sensor should be held only at its lower end (cable insert). For accurate readings the sensor tip must have adopted the ambient temperature. With measurements of more than 5 seconds' duration in the immediate vicinity of hot or cold parts (waste gas pipe, radiant heater or refrigera-

tion equipment)

the measurement value may be falsified.

After waiting for about 10 - 15 minutes, as dictated by the temperature difference, a new measure-ment can be taken (temperature equalization between the sensor housing and the ambient temperature). The accuracy of the measurement depends on the temperature uniformity of the measurement device, measurement sensor (all parts e.g. at room temperature) as well as on the relevant degree of emission of the measurement object.

In order to avoid measurement errors and to protect the equipment against damage, the user should not

- press the sensor opening of the measurement sensor directly against the object being measured,
- measure in an atmosphere that is contaminated or contains vapour,
- measure through a strongly heated atmosphere (flickering)

- measure objects directly exposed to strong sunlight (shade the objects),
- measure objects in the immediate vicinity of strongly heat-emitting or cold-emitting equipment

(interrupt heat/cold radiation),

- expose the high-quality measurement device to the influence of strong heat or cold sources (transport in the baggage compartment),
- expose the measurement device to high atmospheric humidity (condensing),
- stretch the connecting cable or excessively twist the spiral cable,
- carry out measurements in rapid succession (wait approx. 5 seconds between each measurement),
- perform measurements in the immediate vicinity of electromagnetic or electrostatic sources.

Degree of emission

The measurement sensor is set to a degree of emission of 95 %. This value covers most building materials, synthetic materials, textiles, paper and non-metallic surfaces. The following list is used to estimate the emission factor, which is affected by, among other things, the shine and roughness of the object being measured. Flat and shiny surfaces reduce the degree of emission while rough and dull surfaces increase the degree of emission.

Since with metals the emission factor ranges from 10 % to 90 % depending on the surface (shiny, oxidised or rusty), an exact measurement is not possible. It is, therefore, recommended to use special paper stickers with a factor of 95 % for metals or metallically shiny surfaces and objects with variable emission factors.

A correction of the temperature reading by the emission factor requires knowledge of the ambient temperature and a temperature equilibration of the sensor with the ambient temperature.

The correction is calculated according to the following equation:

(T reading - T ambient) x 100

+ T ambient = T measurement object.

Degree of emission (%)

Table of degree of emission (%) for the range 0 - 200 °C

Asbestos	95 %	Marble	90 to	95 %
Asphalt	90 to 95 %	Paints *	90 to	95 %
Bitumen	98 to 100 %	Paper *		95 %

Brickwork (rough)	90 to	95 %	Plaster	90 to	95 %
Cement	90 to	95 %	Plastic materials		90 %
Ceramics	90 to	95 %	Roofing fabric		95 %
Clay		95 %	Sand		90 %
Concrete		95 %	Textiles *		95 %
Earth		95 %	Wallpaper *		95 %
Glass	90 to	95 %	Water		93 %
Gypsum	85 to	90 %	Wood	90 to	95 %
Limestone		95 %			

*) non-metallic

Size of the measurement spot

The measurement spot diameter depends on the distance from the sensor and has a size of 8 mm immediately in front of the orifice of the sensor. The diameter of the measuring spot increases proportionally at a ratio of approx. 2.5:1. At a distance of 100 mm the measuring spot has a diameter of 45 mm. A distance of 20 to 50 mm between the sensor and the material to be measured is recommended. The relevant diameter can be determined by means of the following diagram.



A = Distance between the measuring sensor and the object to be measured

B = Diameter of the measurement spot.

Measuring electrodes and other accessory



Drive-in Electrode M 20 (Ref. No. 3300)

for surface and subsurface measurements on wood up to 50 mm thick. Also for testing chipboard, fibreboard and set construction materials (plaster, mortar, etc.), with measuring pins

- 16 mm long (Ref. No. 4610), penetration depth 10 mm

- 23 mm long (Ref. No. 4620), penetration depth 17 mm.

Surface Measuring Caps M 20-OF 15 (Ref. No. 4315)



for moisture measurements on surfaces (e.g. veneer, concrete) without damaging the material (only in conjunction with electrode M 20).

Ram-in Electrode M 18 (Ref. No. 3500)

for testing timber up to 180 mm thick, with uninsulated pins, as standard equipment,

- 40 mm long (Ref. No. 4640), penetration depth 34 mm
- 60 mm long (Ref. No. 4660), penetration depth 54 mm, or

optionally

with pins with insulated shank

- 45 mm long (Ref. No. 4550), penetration depth 25 mm
- 60 mm long (Ref. No. 4500), penetration depth 40 mm.

Stick-in Electrode pins M 20-HW 200/300

uninsulated pins, for testing chips, wood-wool, veneer piles (only in conjunction with electrode M 20), with pins

- 200 mm long (Ref. No. 4350)

- 300 mm long (Ref. No. 4355)





Brush Electrodes M 25 (Ref. No. 3740)

made of stainless steel, for moisture measurements of hard and soft building materials without contact paste, measuring depth up to 100 mm.



Stick-in Electrodes M 6 (Ref. No. 3700)

for testing hard building materials, using contact paste and pre-drilled holes, with pins

- 23 mm long (Ref. No. 4620)
- 40 mm long (Ref. No. 4640)
- 60 mm long (Ref. No. 4660)

Flat Electrodes M6-Bi 200/300

for measurements in insulating material of cement flooring through the edge joint (with insulated shank), only for use in conjunction with the handles of the electrodes M 6.

- size 10 x 0.8 x 200 mm (Ref. No. 3702)

- size 10 x 0.8 x 300 mm (Ref. No. 3703)

Stick-in Electrodes M 6 – 150/250

especially thin and uninsulated pins for testing building and insulating materials through the joint or cross joint of tiles

Size 150 x 3 mm Ø (*Ref. No.* 3706) Size 250 x 2 mm Ø (*Ref. No.* 3707)

(for use with M 6 and M 20 electrodes)

Deep Electrodes M 21-100/250

for deep measurements in set building materials, in conjunction with contact paste and pre-drilled holes

- 100 mm long (Ref. No. 3200)
- 250 mm long (Ref. No. 3250).



Contact Paste (Ref. No. 5400)

to ensure good contact between electrode pins and tested building materials. For moisture measurements in hard building materials (cement flooring, concrete, etc.) with electrodes M 6 and M 21.



Live electrode MB 35 (*Ref. No. 3770*) with integrated measuring circuit, designed for surface measurement of concrete, in particular prior to coating or gluing.

Measuring range: 2 to 8 % m.c. of dry weight according to oven test.

Active Electrode B 50 (Ref. No. 3750)

with integrated measuring circuit, designed for nondestructive location of moisture concentration in construction materials and moisture distribution in walls, ceilings and floors.

It works according to a special measuring procedure and generates a concentrated high frequency field with substantial penetration depth.

Measuring range: 0 to 199 digits, classification by table.

0.3 to 8.5 % of dry weight, conversion by table according to material tested.

0.3 to 6.5 % CM, conversion by table according to material tested.



Active electrode B 60 (Ref. No. 3760)

with integrated measuring circuit, designed for non. destructive location of moisture concentration in construction materials and moisture distribution in walls, ceilings and floors.

It work according to a special measuring procedure and generates a concentrated high frequency field with substantial penetration depth.

With built-in limit value selector and acoustic signal generator. Setting range: 20 to 140 digit.

Measuring ranges: 0 to 199 digits, classification by table.

0.3 to 8.5 % of dry weight conversion by table according to material tested.

0.3 to 6.5 % CM, conversion by table according to material tested.



Infrared Surface Temperature Sensor IR 40

(Ref. No. 3150)

Contactless temperature measurement from -20 to +199.9

resolution 0.1 °C, emissivity permanently set at 95 %, ratio of measured area to distance 2.5:1 (Ø 45 mm at a distance of 100 mm), sensor length 185 mm x 36 x 33 mm, coiled cable 320/ 1200 mm.

An ideal sensor for detection of heat bridges, determination of the dew point temperature, measurement of live, moving or vibrating components as well as measurement of components with low heat capacity, e.g. wood, glass, insulating materials, etc.



Matt-black stickers IR 30/E 95 (Ref. No. 5833)

Measurement spot 30 mm ø, emissivity 95 %, e.g. for measurement of metallic surfaces.



°C,



Carrying Case (Ref. No. 5085)

for storing and transport of the measuring instrument and the standard and optional accessory



Measuring Cable MK 8 (Ref. No. 6210)

for connection of the electrodes M 6, M 18, M 20, M 20-HW and M 21 $\,$



Rechargeable Battery with Charging Unit (*Ref. No. 5100*) for use instead of 9 V dry battery supplied as standard.

Test Devices

()	4
TT	X5-Y9
Temp. 20	°C - 70°F
21,0%	++ 0,5
GANN -	Stuttgart

Test Standard (Ref. no. 6070)

for checking the wood moisture measuring section of the measuring instrument.



Test Standard (Ref. No. 6071)

for checking the measuring section for building materials.



Test Standard (Ref. No. 6073)

for checking the active electrode MB 35.

Warranty

GANN warrants for six months from date of purchase or one year from date of delivery from his factory whichever period elapses first, to correct by repair or replacement of defective parts free of charge any product defect due to faulty material or poor workmanship. Replacement or repair of any part do not constitute a new warranty period or an extension of the original warranty period.

When lodging a warranty claim, return the meter complete with all accessories, postage paid, to GANN or to the supplier, together with a description of the fault noticed. Proof of purchase is required.

This warranty does not cover batteries, cables and electrode pins. GANN assumes no responsibility for damage or faulty performance caused by misuse or careless handling or storage, or where repairs or other manipulations have been made or attempted by the owner or third party.

GANN Mess- u. Regeltechnik GmbH

Schillerstrasse 63 70839 Gerlingen, Germany

EC Declaration of Conformity

in accordance with the EC Directive on Electromagnetic Compatibility 89/336/EEC in version 93/31/EEC

We hereby declare that the handheld moisture meter

GANN HYDROMETTE HB 30

corresponds to the aforementioned directive both with respect to its conception and type of construction and the design as marketed by us.

This declaration becomes void if the moisture meters are modified without our approval.

Applied harmonized standards in particular:

EN 55011/03.91 - DIN VDE 0875-11/07.92 DIN EN 50082-1/03.93

Applied national technical standards and specifications:

IEC 1000-4-2/1995	- IEC 1000-4-4/01.95
IEC 801-3/1984	- IEC 65A/77B

GANN Mess- u. Regeltechnik GmbH, Stuttgart, Germany