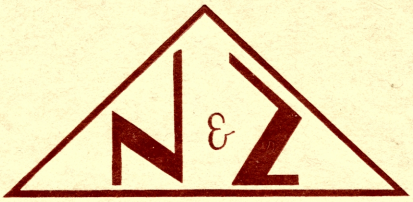
HYGROMETERS

INDICATING · RECORDING



LIST H/20/1

NEGRETTI & ZAMBRA

LONDON

Guarantee

INSTRUMENTS

We guarantee all instruments of our manufacture and if within two years from the date of supply any defect is discovered in material or workmanship it will be made good without charge. The instrument must be returned to us carriage paid with the seals, where provided, intact.

Our liability is restricted to the cost of making good the defect.

ACCESSORIES

We take all care in the selection and testing of accessories which we purchase from other manufacturers, but we cannot guarantee their performance beyond the period given by their makers.

ADVISORY SERVICE

We are always prepared to give advice both relative to the selection of the best instrument for a given purpose, as well as installation and maintenance, with the object of assisting you to obtain maximum satisfaction from our instruments.

This guarantee does not apply to the Gregory Hygrometer Elements, the life of which varies from 4-12 months, according to conditions.

NEGRETTI & ZAMBRA LTD.

NEGRETTI & ZAMBRA

Hygrometers

LIST NO. H/20/1
(1954)

NEGRETTI & ZAMBRA LTD

P. A. Negretti P. N. Negretti S. H. Pitt H. W. Ibbott

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Codes : A.B.C., 5th and 6th.
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ESTABLISHED 1850

HYGROMETERS

Introduction

A STUDY of the water vapour present in the atmosphere is termed **"Hygrometry"** and instruments for determining either the Absolute or Relative Humidity are called **"Psychrometers"** or **"Hygrometers."**

The measurement of **Absolute Humidity** is a somewhat slow and laborious process and is unsuitable for Meteorological and General Industrial purposes.

Relative Humidity, on the other hand, can be determined simply and accurately and the instruments described in this list are all based on this principle.

It will be seen that the instruments listed are of three main types :—

(a) **Wet and Dry Bulb Hygrometers.**
(b) **Hair Hygrometers.**
(c) **Gregory Electrolytic Hygrometers.**

Each of these types is suited for a particular purpose and this is discussed more fully on page 5.

Humidity measurement has long been recognised as one of the fundamental aids to **Meteorology** and we have had a wide experience in this field from the earliest days of weather forecasting. It is only more recently, however, that the importance of Hygrometry has been appreciated in **industry** and **commerce** and with the rapidly growing popularity of air-conditioning and numerous applications of storing, seasoning and curing of tobacco, timber, fruit and many other commodities, the accurate measurement of Humidity has become a necessity.

Very often it is not sufficient merely to measure the Humidity, and some form of control is required as well. This, of course, is a subject in itself and no attempt has been made in this list to go into the problems involved, or indeed to describe the instruments and accessories required. A complete section, however, is devoted to **Humidity Control** in our latest catalogue **No. R/30 "Automatic Controllers"** which we would be pleased to send on request.

HYGROMETERS

Contents

HYGROMETERS

Principles of Hygrometry

UNDER normal conditions there is always a certain amount of water vapour present in the atmosphere and this vapour exerts a definite pressure on its surroundings, depending on the temperature and for a given volume on the amount of vapour present.

Vapour Pressure

This pressure may be found by calculation providing the wet and dry bulb temperatures and the barometric pressure are known.

Absolute Humidity

This is a measure of the actual amount of water vapour present in the air and is usually expressed in gm./cm^3 or grains/ft.^{3} and is directly proportional to the vapour pressure at a given temperature. This cannot, however, be measured by any simple means, but can be obtained from tables, if certain other factors are known.

Relative Humidity

This is usually expressed as a percentage and represents the amount of **water vapour present in a given space compared with the amount which would need to be present in order to saturate that space at the same temperature.** This value can be simply and easily found by means of any of the instruments described in this list.

Wet and Dry Bulb Temperatures

The temperature of a " Wet Bulb Thermometer " i.e., one in which the sensitive bulb is surrounded by a wick kept saturated with distilled water will always show a lower temperature (**depression**) compared with a normal " Dry Bulb Thermometer " when ventilated by a stream of unsaturated air. This depression has been found to bear direct relationship to the Relative Humidity and, as a result of numerous experiments, tables have been compiled in which this relationship is set down.

Dew Point

When unsaturated air containing moisture is cooled a temperature will be reached at which condensation commences. This temperature is known as **" Dew Point."** Provided the dew point and the original temperature is known the Relative Humidity of the air at the original temperature may be found from tables.

HYGROMETERS

Types

HYGROMETERS described in this list are of three main types as mentioned on page 2. We shall always be pleased to advise customers as to the most suitable types for any particular purpose but as a guide we give below some points which should be borne in mind.

Wet and Dry Bulb Hygrometers

The Mercury-in-Glass Wet and Dry Bulb Hygrometer can be regarded as the universal type of instrument for measuring humidity but it must be remembered that a **good circulation of air is required past the bulbs** and that, to obtain a value of Relative Humidity, tables must be consulted. The Mercury-in-Steel or Electrical Resistance Wet and Dry Bulb Hygrometer is useful where remote indication or a record of humidity is required, but this is subject to the same limitations mentioned above.

Hair Hygrometers

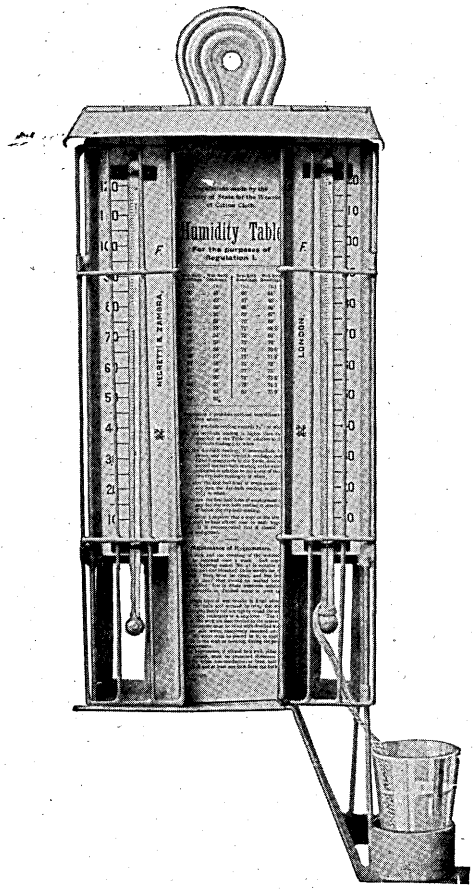
These provide a simple and convenient means of measuring humidity and are calibrated directly in percentage Relative Humidity. They are based on the fact that specially treated human hairs will elongate or contract with changes in humidity, but must be considered useful only where an approximate reading is required with the minimum of trouble and expense. They require good ventilation with free air and give readings **accurate to about 3 per cent.**

Gregory Hygrometers

These instruments combine the advantages of the types mentioned above and added to this is the fact that they will function successfully with the minimum of free air circulation. Their readings are **accurate to 1 per cent** and they can be arranged to indicate, record or control at a distance if required.

HYGROMETERS

Wet and Dry Bulb Type



HYGROMETER, WET AND DRY BULB, for factory use: 10″ tubes divided on the stem and mounted on opal scales, with main divisions and figures fired on. Scales sliding into grooves. Sheet metal case enamelled white. Hinged wire guard over each thermometer. Complete with muslin, humidity table mounted on frame, and water bottle, as illustrated.

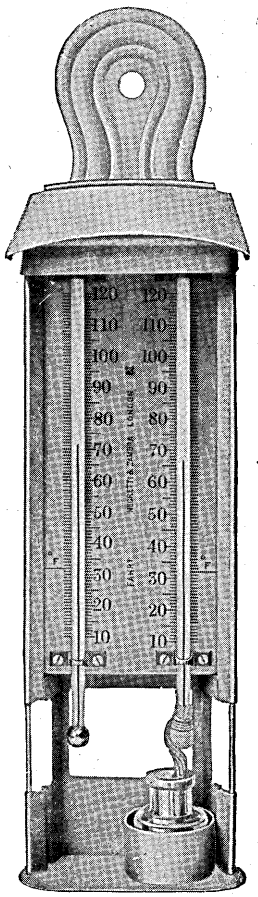
No.	*Range*
5586	HYGROMETER as described, range 10° to 120° F.
5587	Ditto, range 40° to 90° F.
5588	Ditto, range 40° to 180° F.

GUARANTEED FOR TWO YEARS

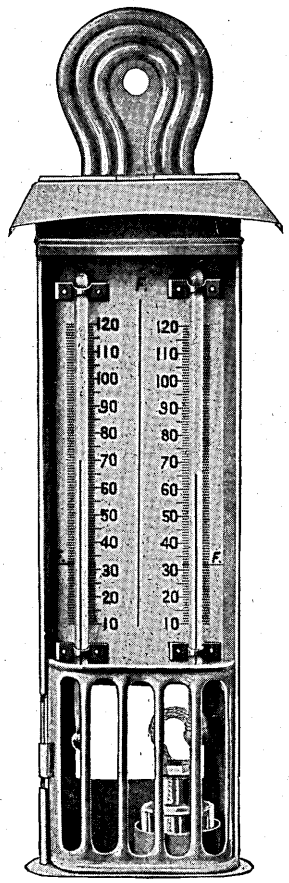
HYGROMETERS

Wet and Dry Bulb Types

HYGROMETER, MASON'S TYPE, one of the simplest forms of Wet and Dry Bulb Hygrometers : with 8 inch tubes, in white japanned metal case, complete with muslin for the wet bulb and wick dipping into water bottle.



No.		*Range*
5569	Boxwood Scale	10/120° F.
5570	„ „	−10/+50° C.
5571	Zinc Scale	10/120° F.
5572	„ „	−10/+50° C.



Copper case for above instead of japanned metal case may be had at extra cost. See separate price list.

HYGROMETER, MASON'S TYPE, 8 inch tubes, **porcelain** scale, in white japanned metal case with hinged protection to bulbs, complete with muslin, wick and water bottle.

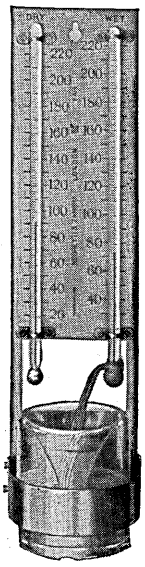
No.	*Range*
5574	10/120° F.
5575	30/90° F.
5576	30/180° F.
5577	−10/+50° C.
5578	0/35° C.
5579	0/80° C.

Copper case for above instead of japanned metal case may be had at extra cost. See separate price list.

SPECIFY NEGRETTI AND ZAMBRA

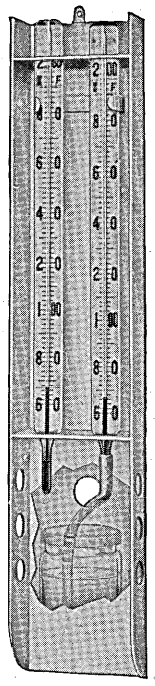
HYGROMETERS
Kiln and Duct Types

5630 A. WET AND DRY BULB THERMOMETER FOR KILNS. Brass scale with sides turned back, and brass ring and base for water vessel. Engraved divisions and figures. Divided tubes 6 inches long with mercury columns. Range 40/220° F., or 0/100° C. Complete with muslin, wick and well for water.



5630 A

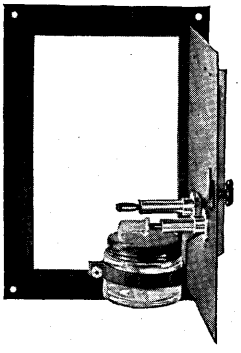
5630 C. TIMBER KILN WET AND DRY BULB THERMOMETER, with insulated thermometers ranged 80° to 200° F., bold spirit columns for reading at a distance, in white enamelled metal case measuring 22″ × 4⅛″ × 5¼″. Complete with muslin, wick and well for water.



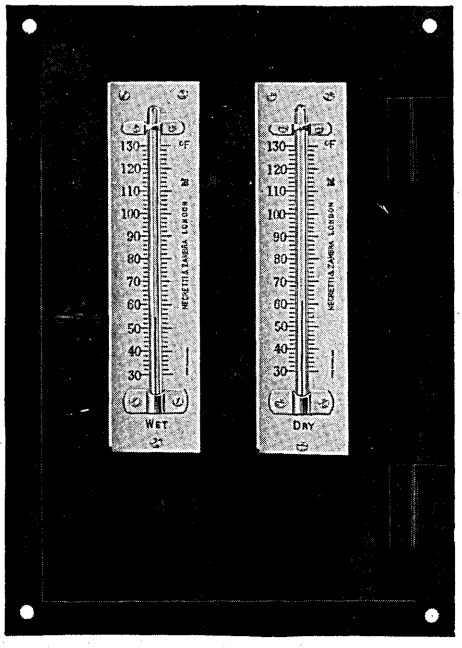
5630 C

5630 B. WET AND DRY BULB THERMOMETER FOR DUCTS, on steel panel 11⅛ inches long, 7¾ inches wide. The instrument can be permanently fixed in position, as the panel is provided with a hinged door. The back is thus accessible and the water supply can be easily replenished and new wicks fitted.

The thermometer scales are lacquered brass, with mercury tubes, range 30/130° F. or 0/55° C. ; the panel is finished black enamel.

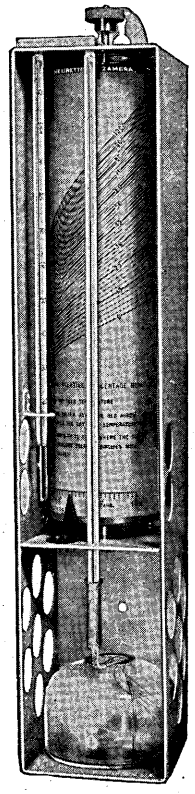


Showing Door Open



HYGROMETERS

Direct Reading Types



DH/10

THE HYGROVISOR directly indicates the percentage of relative humidity of the atmosphere. By turning the drum so that the pointer indicates the dry bulb temperature, the percentage of r.h. is read at the top of the wet bulb mercury column. The instrument should be subjected to a free flow of air, or the bulbs fanned before a reading is taken.

One thermometer is divided and figured on the stem and the other undivided and mounted in front of a vertical drum marked with the scale of humidities.

A ventilated case provides protection. A large water bottle contains sufficient distilled water for over one week. 6 spare wicks are supplied.

Dimensions : $18'' \times 3\frac{3}{8}'' \times 3\frac{3}{8}''$

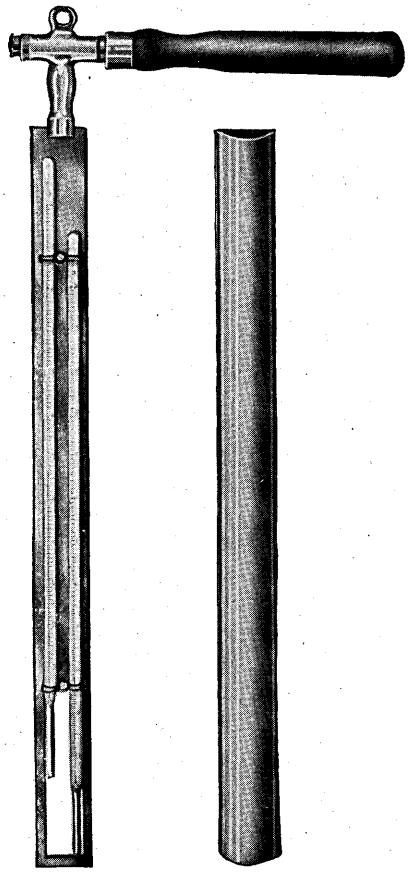
No.	*Description*
D.H.10	" HYGROVISOR " dry bulb range 30/100° F. and 0/38° C., wet bulb range 20°/100° F. and −7/+38° C. Humidity 0/100%.
D.H.12	" DEWVISOR " similar to above, but with the scale of dewpoint temperatures ; dry bulb 25/140° F. and −4/+60° C. Dewpoint scale 10/80° F. and −12/+27° C. Wet bulb 25/90° F. and −4/+32°C.
	Spare tube for dry bulb, see separate price list.
	Spare tube for wet bulb, see separate price list.

GUARANTEED FOR TWO YEARS

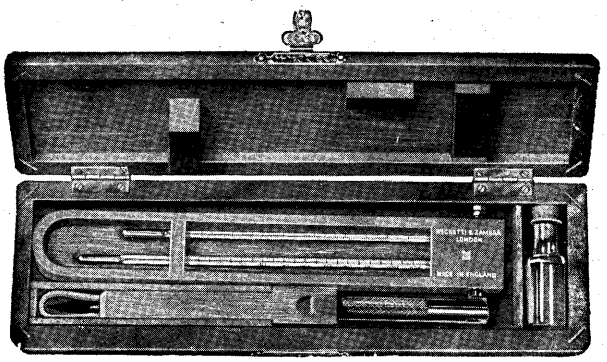
HYGROMETERS

Whirling Types

WHIRLING OR SLING HYGROMETERS. The hygrometer should be whirled for about half a minute, stopped and quickly read—the wet bulb first. This should be repeated three or four times. The revolutions should not be less than 4 per second in order to obtain an air speed past the wet bulb of at least 15 feet per second.



5615



Tubes 6 inches long, length of scale 4 inches, divided and figured on the stem to 1° F. or ½° C. Mounted on aluminium frame, with folding handle. Complete with spare muslins, brush, etc., fitted in mahogany case.

No.	*Description*	*Range*
5607	Pocket Whirling Hygrometer	10/110° F.
5608	Ditto	−10/+45° C.
	Spare Tubes each—see separate price list.	

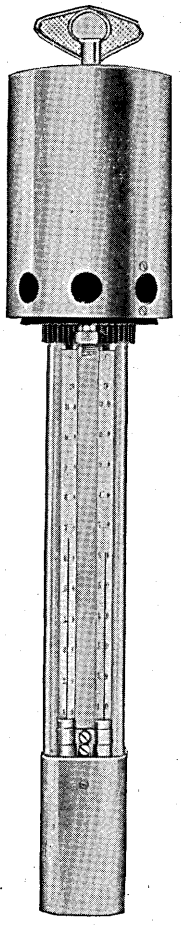
Dimensions of case : $9\frac{3}{4}'' \times 2\frac{1}{2}'' \times 1''$

WHIRLING HYGROMETER, PRECISION TYPE, tubes 11 inches, divided and figured on the stem to ½° F. or ⅕° C., mounted on brass frame with handle; complete in polished copper case. The revolutions should not be less than 2 per second.

No.	*Range*
5615	10/110° F.
5616	20/130° F.
5617	−10/+45° C.
5618	−5/+55° C.
Spare Tubes each—see separate price list.	

HYGROMETERS

Assmann Type



THE ASSMANN TYPE HYGROMETER OR PSYCHROMETER is for the purpose of obtaining humidity readings with high precision.

It consists of two very accurate thermometers 11 inches long, divided and figured on the stem, with the bulbs mounted in two air ducts. A centrifugal fan operated either by a clockwork movement, or by an electric motor, draws the air past the two bulbs. The motor can be supplied for 100 to 110 volts, or 200 to 250 volts D.C. or A.C.

The bulbs are protected from the effect of radiation by two nickel-plated sleeves which are insulated from the main frame of the instrument.

The instrument is supplied complete with muslins, water filler, and bracket for supporting the instrument, and is fitted in brown plastic case with reinforced corners, recessed handle and spring catches.

No.	*Range*	*Motor*
5619	10/110° F.	Clockwork Electric
5620	20/130° F.	Clockwork Electric
5621	—10/+45° C.	Clockwork Electric
5622	— 5/+55° C.	Clockwork Electric

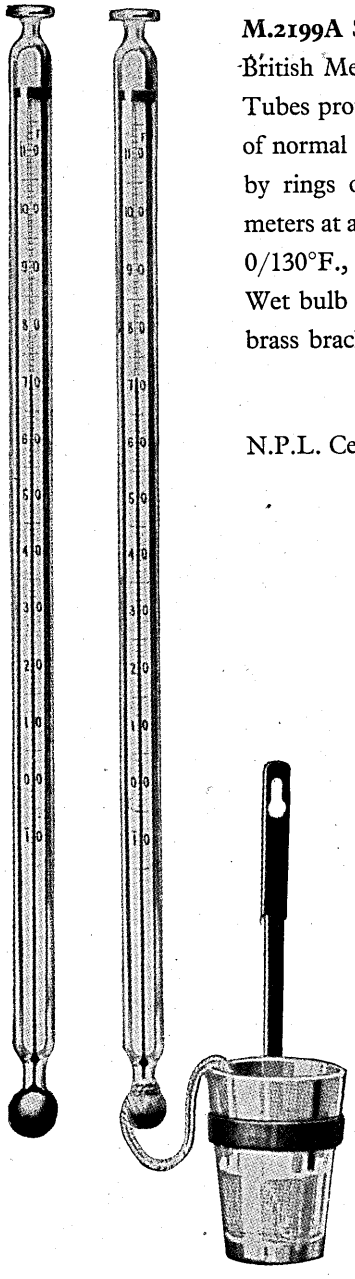
Thermometers, spare, to any of the above ranges.
N.P.L. Certificates, per pair, see separate price list.

Dimensions : $22\frac{1}{2}'' \times 4\frac{1}{2}'' \times 4\frac{1}{2}''$ deep

SENSITIVE RELIABLE ROBUST

HYGROMETERS

Meteorological : Standard Mark I



M.2199A STANDARD HYGROMETER MARK I for use vertically. British Meteorological Office pattern to B.S.I. specification 692–1951. Tubes protected by outer glass sheaths ; overall length 12½ in. Bulbs of normal glass, stems of British lead glass supported inside the sheath by rings of rubber ; sheaths permanently fused on to the thermometers at a point between the bulbs and the lowest graduations. Range 0/130°F., divided on the stem in single degrees and figured every 10°. Wet bulb with muslin and wick. Glass water reservoir with bronzed brass bracket.

N.P.L. Certificate, per pair, see separate price list.

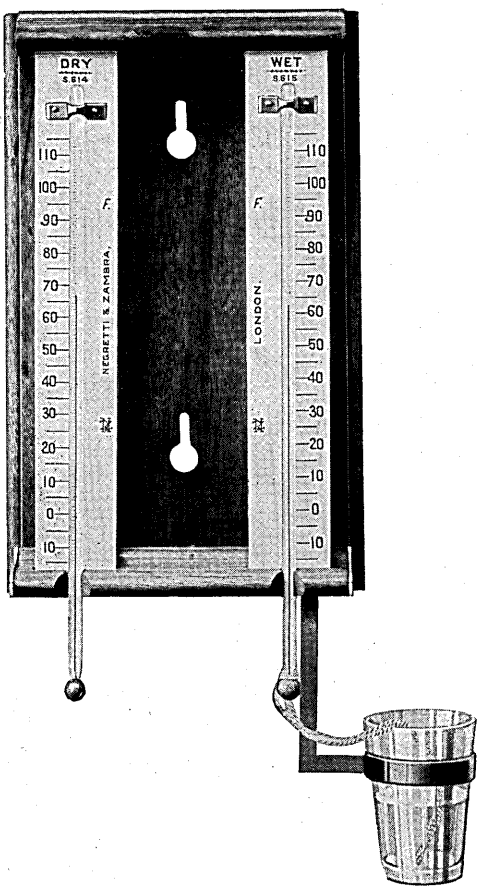
NOTE : In the use of wet and dry bulb Hygrometers, the muslin must be clean, and should be changed before it becomes dirty. The water used must be soft, either distilled or rain water.

Full particulars regarding the management of these instruments during frosty weather will be found in the various meteorological text-books.

GUARANTEED FOR TWO YEARS

HYGROMETERS

Meteorological : Standard



Standard Hygrometer, Wet and Dry Bulb Type.

This instrument consists of a pair of thermometers mounted on a board, the bulb of one thermometer being covered with muslin kept moist by means of a wick dipping into a water reservoir.

Tubes 10¼″ long, with bulbs of normal glass and English lead capillary, fitted on opal glass scale plates on a mahogany mount with two holes for suspension.

Range −15/ + 115°F., divided on the stem in single degrees and figured on the scale every 10°. Glass water cup carried on bronzed brass bracket.

No.	*Range*
M 2200	**Standard Hygrometer**
M 2201	Ditto, −25/+45°C.
M 2202	Ditto, tropical ranges 10/140°F. or −10/+60°C.

National Physical Laboratory certificate, per pair, see separate price list.

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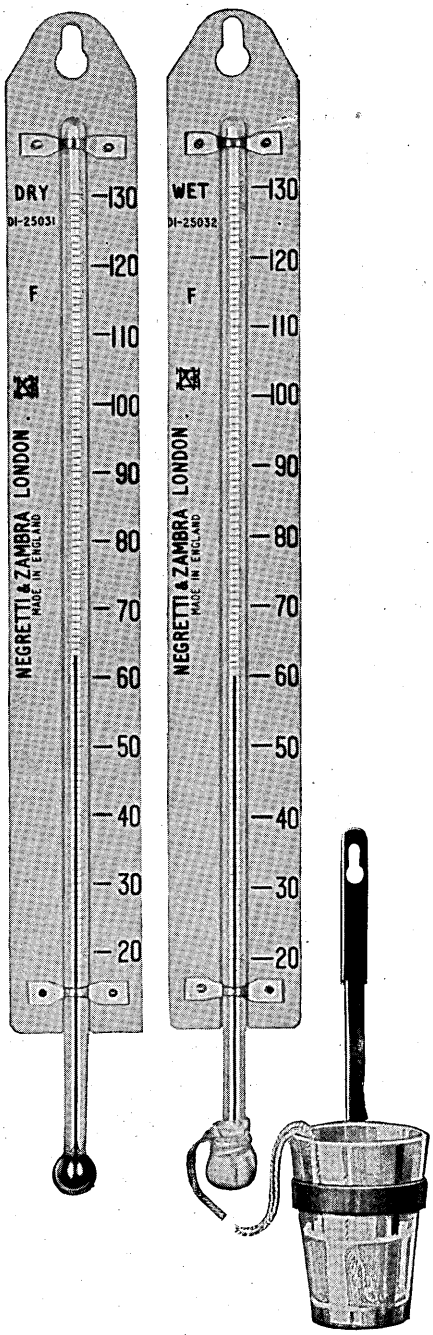
HYGROMETERS

Meteorological : Standard



M.2203 STANDARD HYGROMETER
Tubes 10¼" long, bulbs of normal glass and English lead capillary ; white enamelled steel scale plates. Range 20/130°F., divided on the stem in single degrees and figured every 10 degrees on raised edge scale of plate. Glass water reservoir with bronzed brass bracket.

M.2204 Ditto, −5/+55°C.

The above with tropical ranges :—

10/140°F.
−10/+60°C.

without extra charge.

National Physical Laboratory Certificate—see separate price list.

STANDARD HYGROMETERS, used by the Meteorological Service of the Dominions and Crown Colonies, consist of two ordinary thermometers as described on page 60 of our Meteorological catalogue M/4, or the M.2199A, on page 12 of this list.

HYGROMETERS

Notes on Hair Types

THE HAIR HYGROMETER is based on the hygrometric qualities of human hair which cause it to lengthen or shorten as the humidity of the surrounding air increases or decreases.

It possesses the great advantage of giving **direct readings** in percentage of relative humidity, and can also be made recording ; further, it is more suitable for general use at low temperatures (below the freezing point of water) than the wet and dry bulb thermometer.

This latter advantage is not only due to the difficulty in keeping the wet bulb irrigated but also to the necessity of taking extremely accurate readings at low temperatures, on account of the increase in relative humidity change per degree of wet bulb depression (**1° F.** change of wet bulb depression at **30° F.** represents **9 per cent.** relative humidity whereas at **60° F.** it represents **5 per cent.**).

Hair Hygrometers are used for many industrial purposes where readings of high precision are not required. When used within the following variations of humidity and temperature (humidity **30** to **80 per cent.,** temperature **50°** to **70° F.**) they can be relied on to give readings accurate within **3** to **4 per cent.**

These instruments should be checked and adjusted, after periods of about four months' use, by comparison with humidity values derived from readings of a precision wet and dry bulb Hygrometer of the ventilated or whirling type.

An alternative method, where the instrument permits, is to wet the hairs with distilled water, by means of a fine camel hair brush, the instrument should then read **95 per cent.** relative humidity. It is a peculiar characteristic of hairs that their extension when wetted in this way corresponds to **95 per cent.** of that when exposed to air at **100 per cent.** relative humidity.

In general, rapid changes of humidity or temperature should be avoided as causing incorrect readings. After the wetting test described above, four hours may be required before the instrument regains its normal working conditions.

HYGROMETERS

Notes on Hair Types (Contd.)

Hair has a negative coefficient of extension with temperature, causing the hygrometer to read high at low temperatures and low at high temperatures. Instruments are adjusted at a temperature of **60°** to **65° F.** and will indicate with the accuracy previously stated over the normal air temperature range (**50°** to **70° F.**). If used at temperatures outside these limits the instrument should be checked and reset ; if not adjusted, at **100° F.** the instrument will read approximately **10 per cent.** low and at **20° F. 10 per cent.** high.

It is not advisable to use hair hygrometers in extremes of either humidity or temperature as permanent damage to the hairs may result. Temperatures above **160° F.** cause the hairs to become brittle, and exposure to very low humidities (**5 per cent.**) or low temperatures (below **15° F.**) causes a semi-permanent contraction to take place.

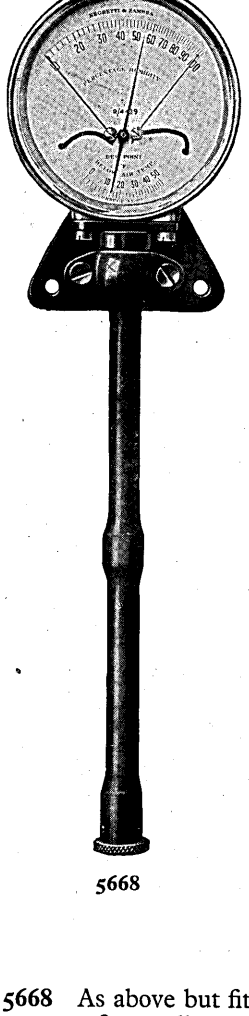
When comparing the respective accuracy of hair and wet and dry bulb hygrometers, it must be realised that unless the wet and dry bulb thermometer is of the **precision type** (viz., with the graduations on the glass stem and complete with test certificate from the National Physical Laboratory), the comparison would be unreliable.

This applies particularly to readings at low dry-bulb temperatures where, for instance, at **40° F.** dry bulb, a $\frac{1}{2}$° **F.** error in the estimation of the wet-bulb depression would cause an error of **4 per cent.** in that of the corresponding relative humidity.

Larger errors in wet-bulb depression values are possible if other than precision thermometers are used, giving rise to equally incorrect relative humidity estimations at more normal dry-bulb temperatures.

HYGROMETERS

Hair Types



5668

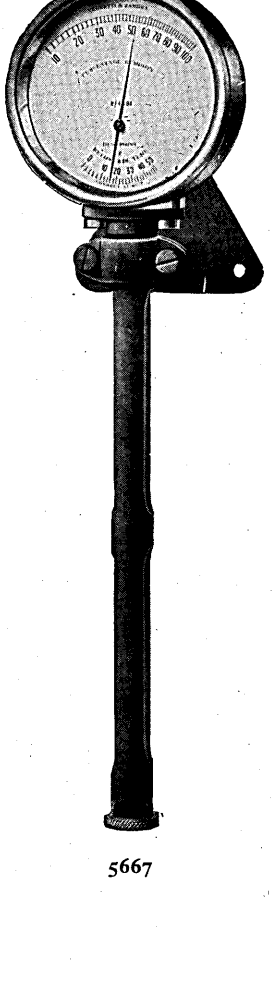
5667 4″ DIAL HAIR HYGROMETER (HYGROSCOPE).

The hairs (which number 12 or more) form the actuating element. Selected human hair is used, specially treated, and great care is taken to ensure even loading on each hair. The mechanism is of the simplest form, the hairs being anchored at the lower ends to an adjustment of special design, and the upper ends connected to a link which operates a lever attached to the pointer spindle. By this means, springs, gears, or cords in the movement are eliminated, thereby reducing errors of backlash, friction, etc., to a minimum, and increasing the sensitivity of the instrument.

The case is a die-casting of tin alloy which will withstand exposure. A bracket is provided which brings the hairs well away from the wall. It also allows the dial to be set parallel to the wall, or to face any direction.

The dial is graduated from 10 to 100 in percentage relative humidity, i.e., the proportion of the existing water vapour to that producing complete saturation. The 100 per cent graduation thus represents complete saturation, and 10 per cent represents very dry conditions.

The lower part of the dial is graduated with a scale to ascertain the dewpoint. It is often useful to know at what temperature dew would form if the existing air were cooled down.

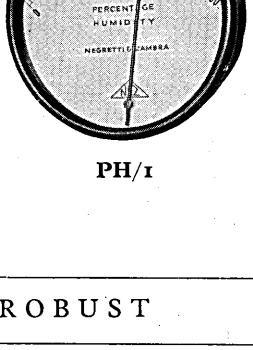


5667

5668 As above but fitted with light adjustable maximum and minimum contacts for small currents not exceeding 4 volt 0·2 amps.

PH/1 4″ DIAL POCKET HAIR HYGROMETER (HYGROSCOPE), range 0/100 per cent relative humidity ; metal case, finished black, with ring top ; dial enamelled white with black divisions and figures.

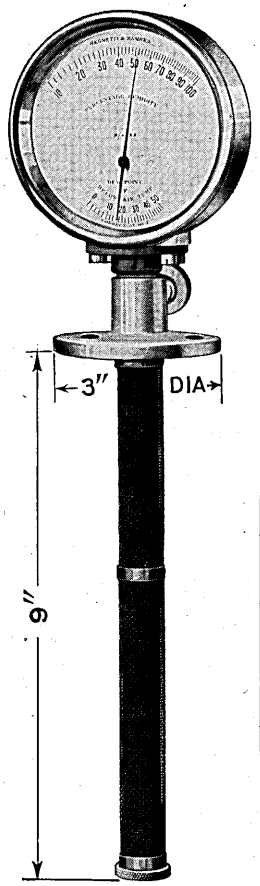
This is an inexpensive type of Hair Hygrometer, portable and convenient in size : it may be hung in positions where there is no room for larger instruments.



PH/1

SENSITIVE RELIABLE ROBUST

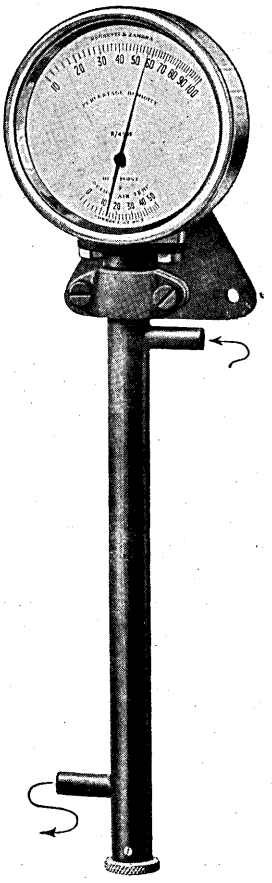
HYGROMETERS
Hair Types for Ducts



HAIR HYGROMETER. For the purpose of indicating steady or fluctuating conditions and approximate percentage of humidity in **air ducts, ventilating systems,** etc., this Hair Hygrometer is supplied with a flange fixing as shown. The tube containing the hairs is inserted in the duct. To avoid unsteadiness due to the velocity of the air, the hairs are surrounded with a close mesh wire gauze.

This instrument is not suitable for air ducts under a pressure exceeding 2 lb. per sq. inch above atmospheric.

5674 4″ Dial Hair Hygrometer (Hygroscope) suitable for air ducts, with flange 3″ diameter.
Range : 10/100% R.H. and dial indicating dewpoint.



HAIR HYGROMETER for use in ducts, etc., under a **small pressure above atmospheric.** A by-pass is taken from the air duct and connected to the upper end of the tube surrounding the hairs. The pressure is sufficient to cause a ventilating air flow down the tube and through the outlet pipe to atmosphere.

No.	*Description*	*Range*
5671	4″ Dial Hair Hygrometer (Hygroscope), with inlet and outlet tubes ; and fixing bracket.	10/100% R.H. and dial indicating dewpoint

GUARANTEED FOR TWO YEARS

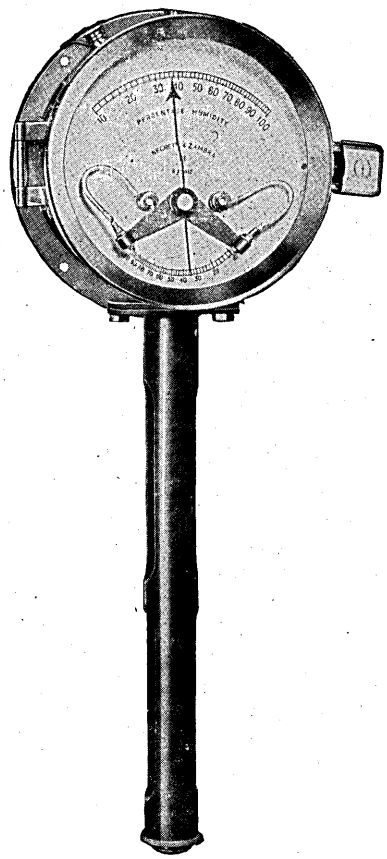
HYGROMETERS

Hair Type : with Contacts

USED in conjunction with relays to control valves or motor starters, or to actuate bells and lights, etc., to give warnings as desired.

R/116 ELECTRIC CONTACT HAIR HYGROMETER, 5 inch Dial : continuously indicating and direct setting, with adjustable maximum and minimum electric contacts of robust construction ; the contacts are insulated from the die cast case, and a hinged bezel is provided, with lock and key. The stem is cut away to allow ample circulation round the sensitive element.

Suitable for voltages not exceeding 25 volts for use in conjunction with relay R/152. A 2′ 6″ length of " Cabtyre " connecting cable protrudes from top of case through an insulated bush. Case tapped $\frac{3}{4}$″ conduit thread to accommodate bush or as conduit entry if desired.

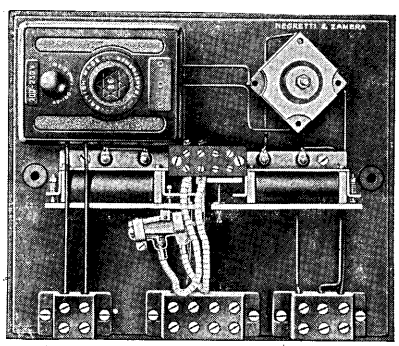


R/116

R/152 RELAY " LATCHING " TYPE, which includes means for producing low voltage supply for instrument contact circuits. With mercury switch which "makes" when one instrument contact momentarily makes and does not " break " until the other instrument contact is momentarily " made."

Note :— " Latching " relays give definite and positive action particularly under conditions of vibration or very slow humidity changes, and in addition permit of switching on at one humidity and off at some other point. **" Latching "** Type Relays cannot be used when two contacts are **" made "** consecutively.

R/152



No.	*Max. Volts*	*Max. Amps*
R/152	250 A.C.	5
R/152D	250 D.C.	0·5
R/153	250 A.C.	10
R/153D	250 D.C.	1

R/566 Fitting 2-way 3 lead switch extra, see separate price list.

HYGROMETERS

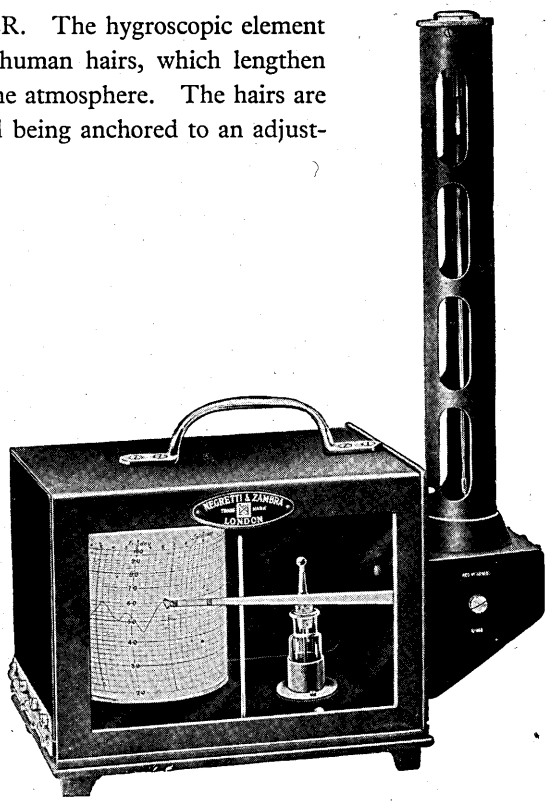
Hair Types : Recording

THE RECORDING HAIR HYGROMETER. The hygroscopic element consists of a number of specially treated human hairs, which lengthen and contract with the variations of moisture in the atmosphere. The hairs are contained in a ventilated brass tube, the top end being anchored to an adjustable screw.

The other end of the hair element operates through a connecting link to a crank on the pen arm spindle.

The design necessitates unequal spacings on the chart, but offers the great advantage that all levers, cams, etc., are eliminated and the hairs are coupled up direct to the pen arm.

Movement mounted on cast iron base, with hinged sheet metal glass panelled cover : charts 3·6″ × 11·2″.



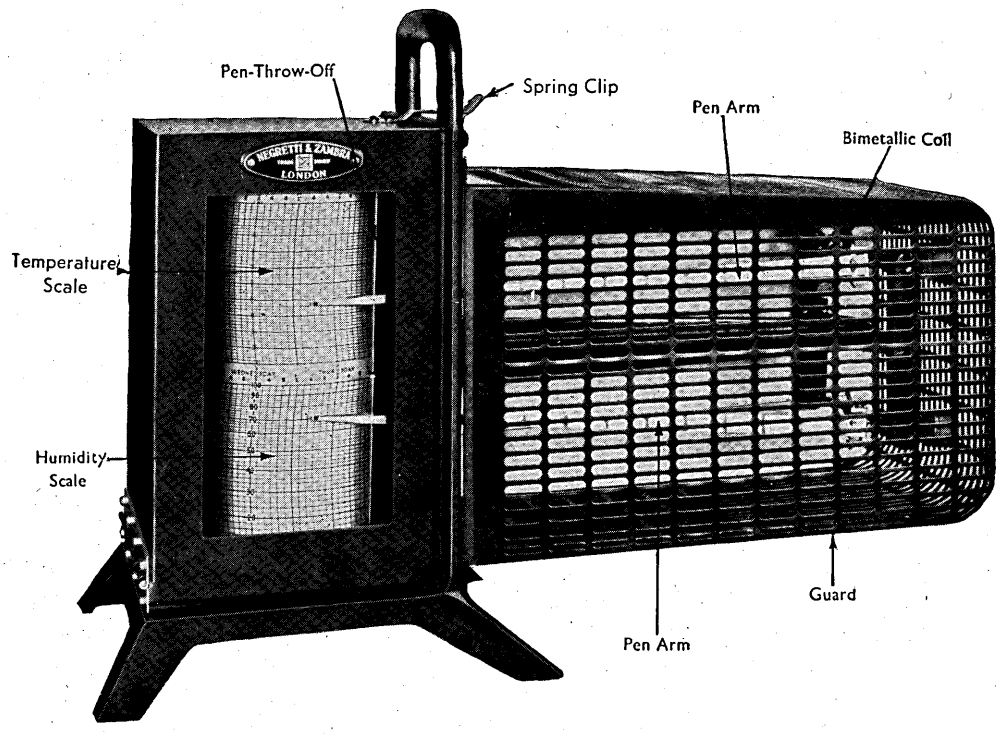
No.	*Description*	*Range*
5669	RECORDING HAIR HYGROMETER as described above. Complete with 100 daily charts (8 day clock) and ink	10/100% R.H.
5670	Ditto, but with weekly charts	10/100% R.H.
5672	Ditto, for **Air Ducts ;** cylinder fitted with inlet and outlet tubes Complete with 100 daily charts and ink	10/100% R.H.
5673	Ditto, but with weekly charts	10/100% R.H.

Dimensions : $10\frac{1}{2}$″ × $5\frac{1}{2}$″ × 14″

SENSITIVE RELIABLE ROBUST

HYGROMETERS

Thermo-Hygrograph



THE THERMO-HYGROGRAPH records on one chart the change in both temperature and humidity. The thermometric element is a bimetallic helical coil, and the pen records on the upper part of the chart.

The hygrometric record is obtained from the action of human hairs, and is on the lower part of the chart.

The total height of the chart is 7″. The pen arm and movements, situated well away from the case, are protected by a perforated metal frame.

RANGES

10/110°F. } 10/100% humidity { −15/+40°C.
30/130°F. } { 0/55°C.

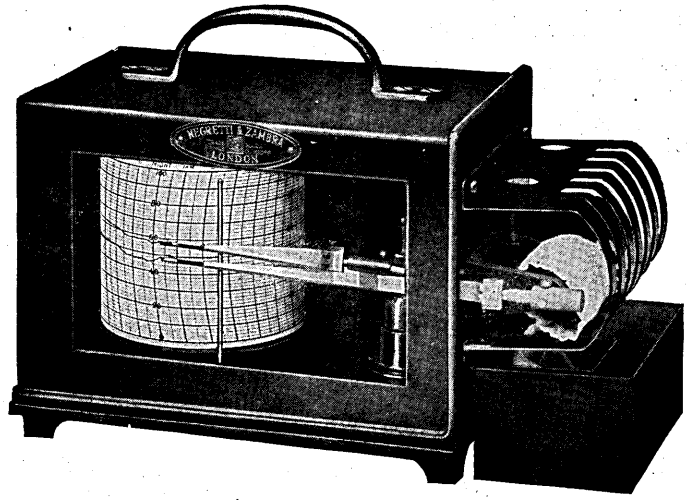
No.	*Description*
5675	THERMO-HYGROGRAPH, or Combined TEMPERATURE and HUMIDITY RECORDER, with cast iron base and hinged sheet-metal glass panelled cover. Complete with 100 daily (8 day clock) or weekly charts, pens and ink.

Dimensions : 12″ × 19″ × 8″

GUARANTEED FOR TWO YEARS

HYGROMETERS

Bimetallic Wet and Dry Types



THE BIMETALLIC RECORDING HYGROMETER is similar in construction to the Recording Thermometer except that a second pen arm and bimetallic coil is provided for the wet bulb readings. One pen traces the air temperature and the other the wet bulb temperature. The wet bulb bimetallic coil is surrounded with a muslin sleeve having a wick dipping into a tank filled with distilled water underneath the coil.

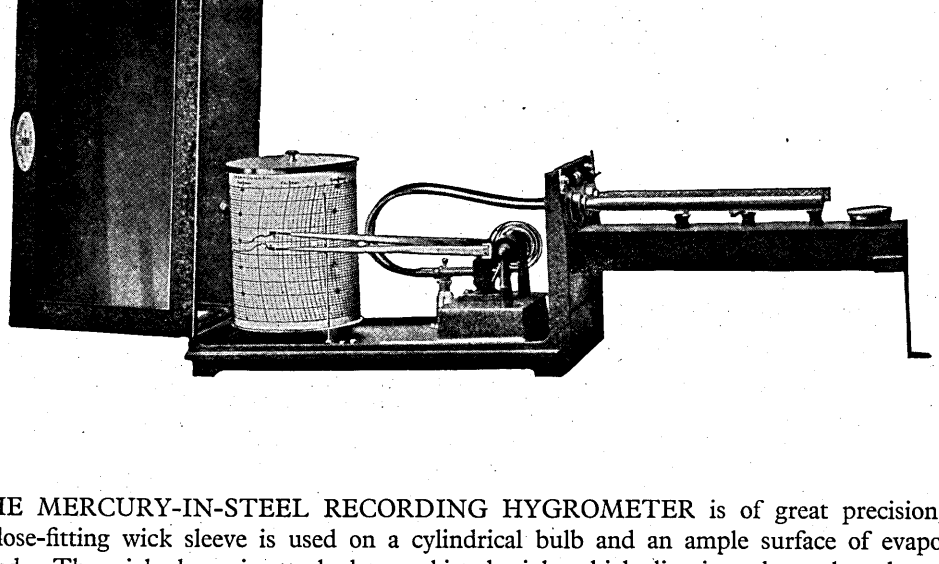
This instrument records the dry bulb or air temperature with precision, but the record of the wet bulb readings can only be regarded as approximate, due to the fact that a film of moisture does not completely surround the bimetallic strip, and to the dead region of air inside the coil.

This instrument is of value in reproducing similar conditions of humidity during a process, but not for giving a true indication of humidity.

No.	*Description*	*Range*
5633	BIMETALLIC WET and DRY BULB RECORDING HYGROMETER : Charts 3·6″ × 11·2″. Complete with 100 daily (8 day clock) charts, pens, and 2 bottles of differently coloured ink.	0/100° F.
5634	Ditto, weekly chart.	0/100° F.
5635	Ditto, but daily chart.	−10/+45° C.
5636	Ditto, but weekly chart.	−10/+45° C.

HYGROMETERS

Mercury in Steel Type : Recording



THE MERCURY-IN-STEEL RECORDING HYGROMETER is of great precision, as a close-fitting wick sleeve is used on a cylindrical bulb and an ample surface of evaporation provided. The wick sleeve is attached to a skirted wick, which dips into the tank and ensures a film of moisture surrounding the bulb.

The mechanism is that of the Negretti and Zambra patent mercury-in-steel principle, fully described in list T/40 " Mercury-in-Steel Thermometers." The bulbs are connected by means of " micro-bore " steel tubing, copper covered, to the bourdon tubes to which the pen arms are attached ; these systems are filled with mercury under pressure so that the slightest change of temperature of the bulbs is immediately transmitted to the chart.

The bulbs are made of mild steel, the dry bulb is heavily copper plated and the wet bulb is tin covered.

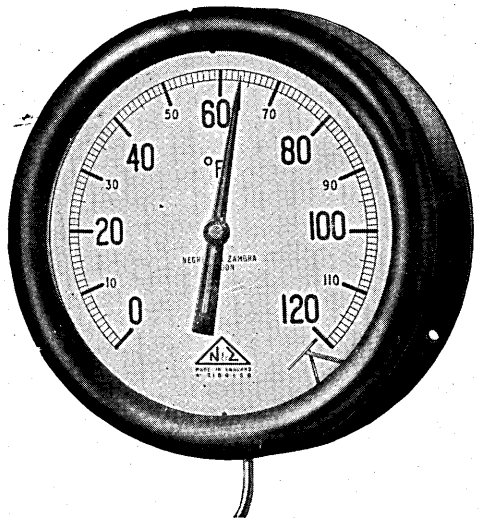
No.	*Description*	*Range*
5639	RECORDING HYGROMETER, WET and DRY BULB Type : with cast iron base and hinged sheet-metal, glass panelled cover, padlock and key: Charts 5·8″ × 16·2″. Complete with 100 daily (8 day clock) or weekly charts; pens; 2 bottles of differently coloured ink; and six spare wick sleeves.	0/100° F. 30/130° F. 50/150° F. −10/+40°C. 0/50° C. 10/60° C.

Dimensions : $27\frac{1}{4}'' \times 8\frac{7}{8}'' \times 7\frac{1}{2}''$

SENSITIVE RELIABLE ROBUST

HYGROMETERS

Distance Type : Indicating

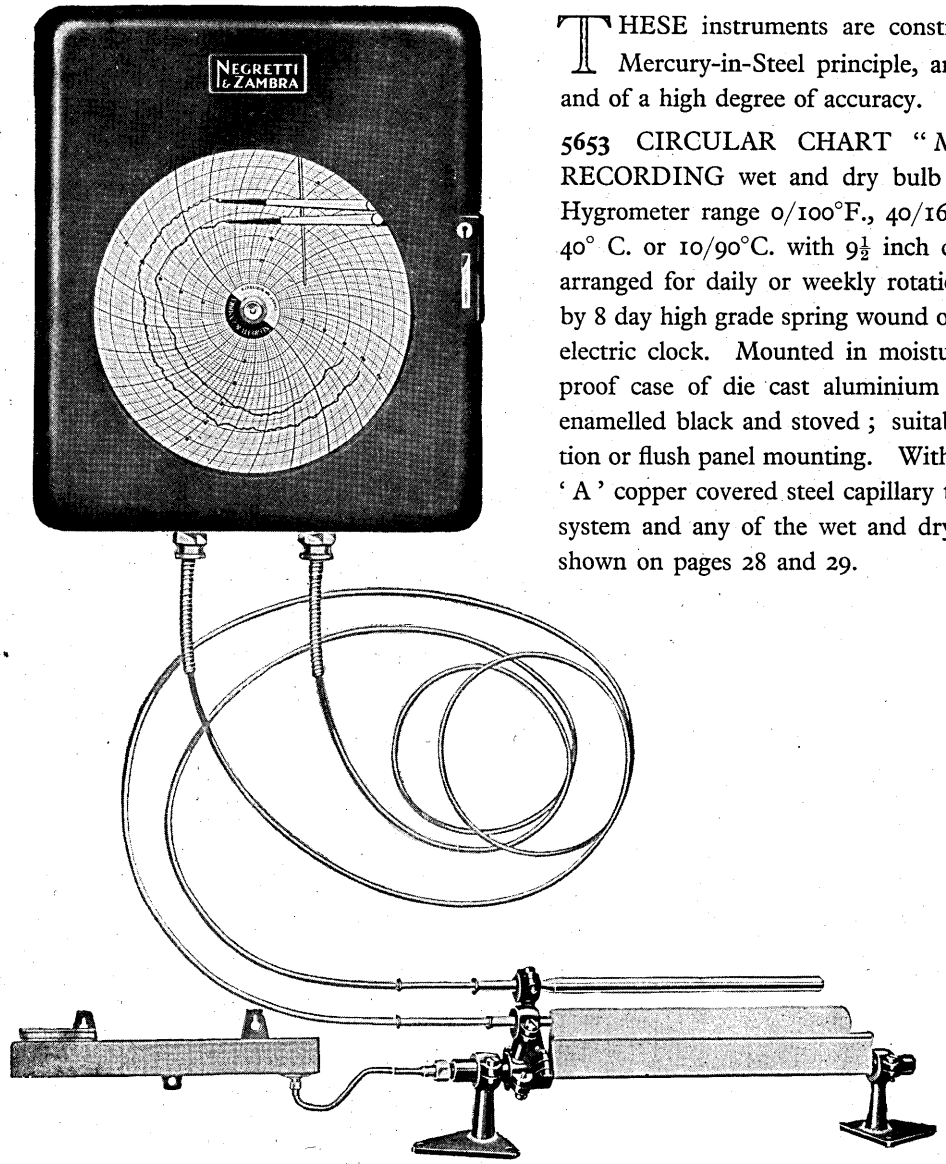


THESE DIAL INDICATORS are constructed on the Mercury-in-Steel principle, fully described in List T/40 " Mercury-in-Steel Thermometers," and are made in three different sizes : 4", 6" and 9". An installation consists of two instruments, one indicating the dry bulb temperature, the other the wet bulb temperature.

T/332 DIAL THERMOMETERS : 4", 6" and 9" sizes with movements mounted in die cast aluminium alloy moisture proof cases, heavily enamelled black and stoved, arranged for projection or flush panel mounting. Any suitable range with 10 ft. of type " A " copper covered steel Capillary (list T/40 page 33) to each instrument, and any of the wet and dry bulb fittings shown on pages 28 and 29.

HYGROMETERS

" Mersteel " Type : Recording



THESE instruments are constructed on the Mercury-in-Steel principle, are very robust and of a high degree of accuracy.

5653 CIRCULAR CHART " MERSTEEL " RECORDING wet and dry bulb distance type Hygrometer range 0/100°F., 40/160°F., −10/+ 40° C. or 10/90°C. with 9½ inch diameter chart arranged for daily or weekly rotation and driven by 8 day high grade spring wound or synchronous electric clock. Mounted in moisture and fume-proof case of die cast aluminium alloy, heavily enamelled black and stoved ; suitable for projection or flush panel mounting. With 10 ft. of type ' A ' copper covered steel capillary tubing to each system and any of the wet and dry bulb fittings shown on pages 28 and 29.

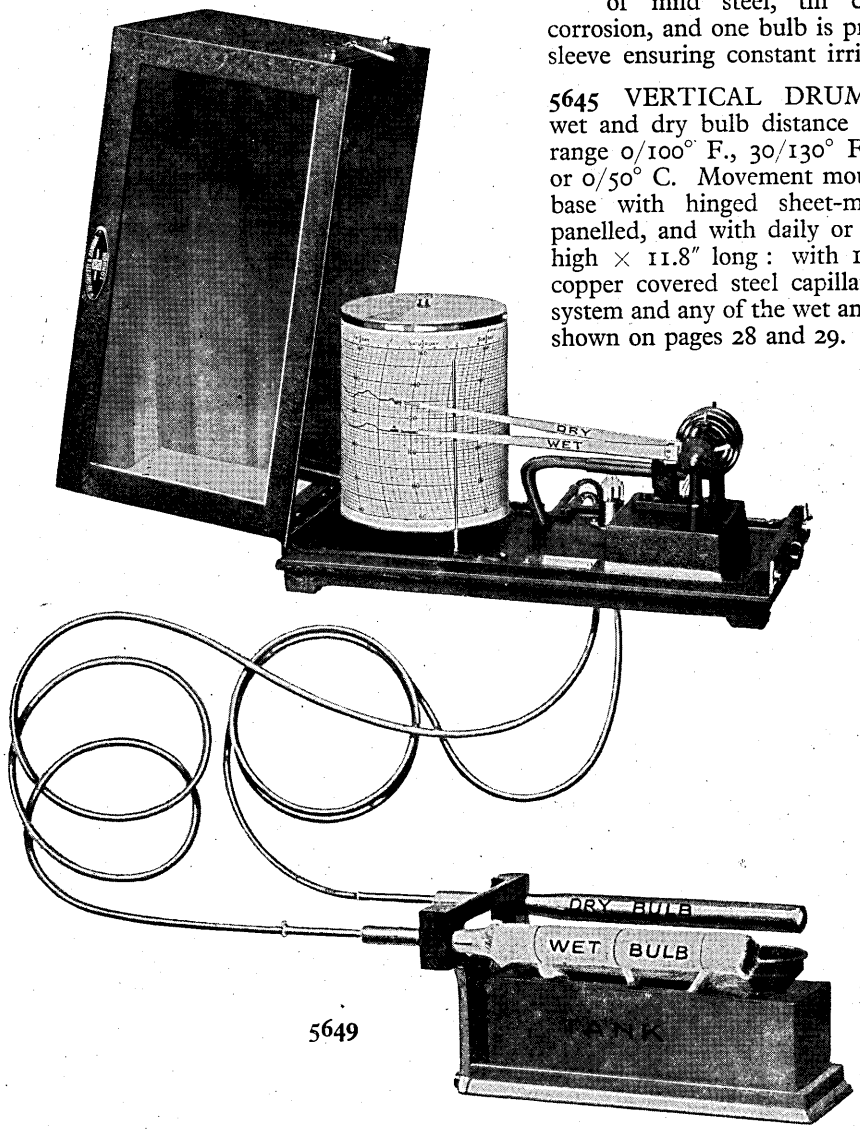
* Extra capillary tubing up to 150 ft. to either bulb available at additional charge.

HYGROMETERS

Vertical Drum Type : Distant Recording

THESE INSTRUMENTS, constructed on the Mercury-in-Steel principle have bulbs of mild steel, tin covered to resist corrosion, and one bulb is provided with wick sleeve ensuring constant irrigation.

5645 VERTICAL DRUM RECORDING wet and dry bulb distance type Hygrometer, range 0/100° F., 30/130° F., −10/+40° C., or 0/50° C. Movement mounted on cast-iron base with hinged sheet-metal cover, glass panelled, and with daily or weekly chart 3.6″ high × 11.8″ long : with 10 ft. of type 'A' copper covered steel capillary tubing to each system and any of the wet and dry bulb fittings shown on pages 28 and 29.



5649

5649 As above, but with chart 5·8″ high × 16·2″ long.
*Extra capillary tubing up to 150 ft. to either bulb, see separate price list.

SENSITIVE RELIABLE ROBUST

HYGROMETERS

Altitude Correction

WHEN **wet and dry bulb thermometers** are used for the determination of humidity, errors are introduced by variations in atmospheric pressure. While these are not significant near sea level, they become considerable where measurements are made at high altitudes. In the ordinary way they would go undetected, but as the **Gregory Hygrometer is not affected under these conditions,** a discrepancy may appear when wet and dry bulb methods are used as a comparison. It is, therefore, desirable that the necessary corrections be applied, and the formula for arriving at these is as follows.

ALTITUDE—5,000 ft.

B = Barometer Reading (e.g. 635.4 mms. Hg. at 5,000 ft.)

Correction Formula :

$$(RH)_C = (RH)_I + \frac{760-B}{760} \left\{ * \frac{Po^{WB}}{Po^{DB}} \times 100-RH_I \right\}$$

(RH)c = Rel. Per Cent. Humidity as correctly measured by the Gregory Type Hygrometer at 5,000 ft. altitude or $(RH)_I$ corrected by above Formula.

$(RH)_I$ = Rel. Per Cent. Humidity as obtained with Wet and Dry Bulb Type Hygrometer at 5,000 ft. altitude.

From the following it will be seen that the errors are quite considerable.

Examples

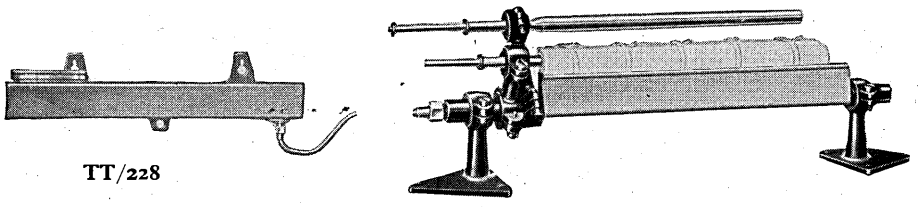
		INCORRECT VALUES	CORRECT VALUES
Dry Bulb	*Wet Bulb*	RH_I	*RH*c
10°C.	3°C.	24%	30·4%
10°C.	5°C.	44%	48·44%
10°C.	8°C.	77%	78·7%

* Po^{WB} = Saturation Pressure at temperature of Wet Bulb.

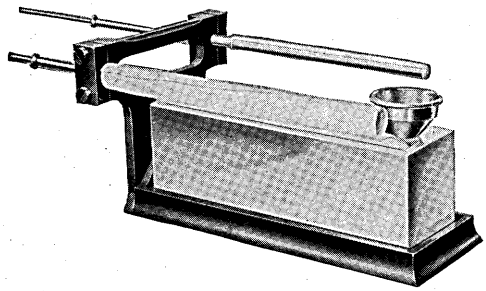
Po^{DB} = Saturation Pressure at Dry Bulb temperature.

HYGROMETERS

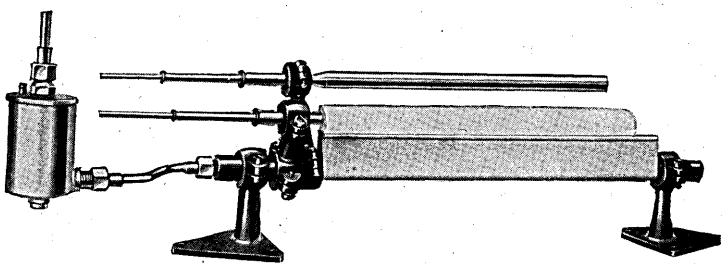
Wet and Dry Bulb Fittings



TT/228



TT/231



TT/232

DISTANCE TYPE HYGROMETERS can be provided with different types of bulb to suit the working conditions. The water must be distilled and the wick occasionally changed.

ALL BULBS ARE PROTECTED AGAINST CORROSION; the dry bulb is usually heavily copper plated and the wet bulb protected by a removable stainless steel sheath, but other protecting materials will be arranged on request.

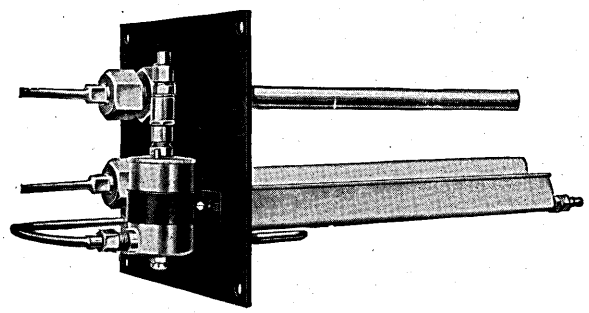
TT/228 The wet and dry bulbs are mounted on adjustable brackets. The supply of water in the copper trough is maintained **from a tank** mounted on a level with it and placed at a convenient distance away: the tank holds sufficient water to last several days.

TT/231 Under the wet bulb a tank is provided into which dips a skirted wick covering the wet bulb. The tank is mounted on a casting to which the wet and dry bulbs are clamped, and requires to be filled with water from time to time.

TT/232 Similar to TT/228, but fitted with **a constant level float chamber** with water supply maintained from a tank at a distance.

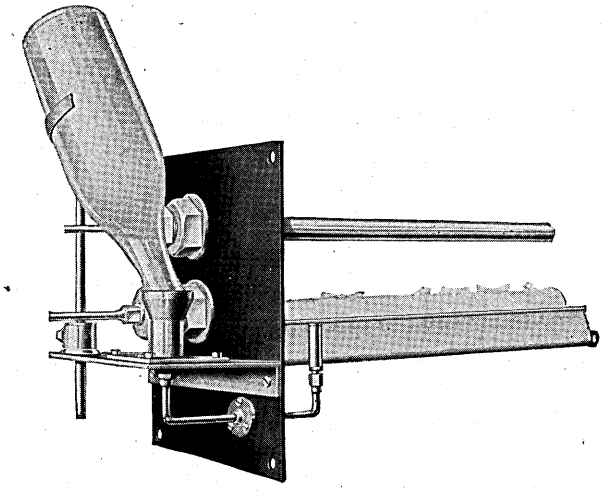
HYGROMETERS

Wet and Dry Bulb Fittings



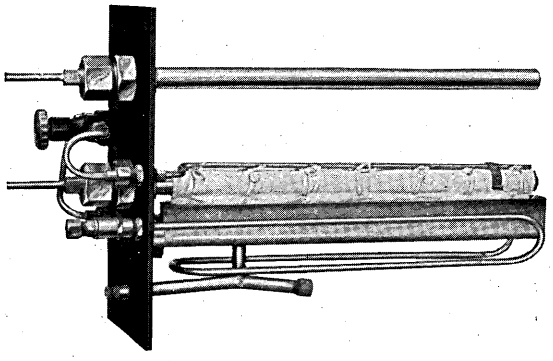
TT/230

Specially designed for use in air ducts for velocities up to 2,000 ft. per minute, and with static pressures. To aid servicing, the float chamber is mounted on the steel panel as illustrated, but for static pressure applications it must be fitted on the converse side, to subject it to the static pressure.
Size of steel panel: 8″ by 8″.



TT/244

Generally similar to the above but not suitable for static pressures. The water feed to the wet bulb is obtained from an imperial quart bottle. The mild steel panel measures 11″ high by 8″ wide.

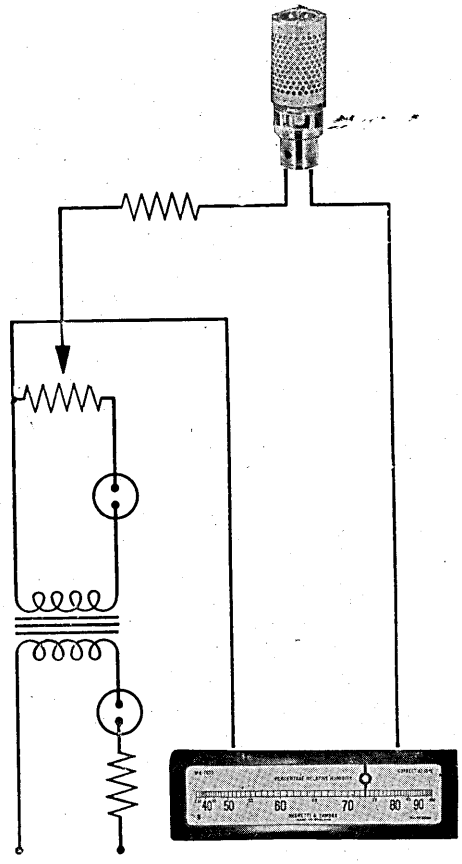


TT/242

Here the wet bulb is irrigated by steam condensate. A small supply of steam condensate enters a copper coil and cools to ambient temperature. A needle valve adjusts the flow of condensate to the water trough into which the bulb wick dips. An overflow tube from the trough is brought outside the panel, and drips indicate that the trough is correctly filled. The steel panel is 11″ by 6″.

HYGROMETERS

"Gregory" Electrolytic Type



200/250V. A.C. Wiring Diagram

THIS apparatus represents a revolution in Humidity measurement and is an entirely new departure from previous methods. The element shown on the opposite page consists of a plastic frame carrying platinum clad electrodes. Round these electrodes is wound a skein of very fine fibres impregnated with a chemical having the property of very rapidly attaining equilibrium with the humidity of the surrounding atmosphere.

The moisture content of the chemical governs its electrical resistance and, with a constant voltage, the current flowing through it. The measurement of this current thus gives a reading of Relative Humidity direct without reference to tables.

An important feature of this instrument is its rapidity of response to a change in humidity and a final reading can be obtained in about 30 seconds. Providing the air is not actually stagnant there is no need for artificial circulation.

In addition to Scientific Research, Meteorological and Air Conditioning purposes, the Gregory Hygrometer can be used for the measurement of humidity in closed spaces such as Grain Silos, Tobacco Curers, Test Cabinets etc.

In small spaces it is particularly valuable since it does not introduce any extra water vapour to disturb the conditions. Furthermore, by means of the Gregory Hygrometer an indication may be given or a record kept at a considerable distance from the point of measurement. A number of individual elements may be connected to a single multipoint indicator or recorder thus enabling one operator to supervise the conditions in widely dispersed locations from a central point. This is most valuable in the case of ships fitted with a number of separate holds where the storage conditions have to be carefully watched.

The Gregory Hygrometer can also be employed for the operation of automatic humidity control equipment (see list **R/30.**).

G U A R A N T E E D F O R T W O Y E A R S

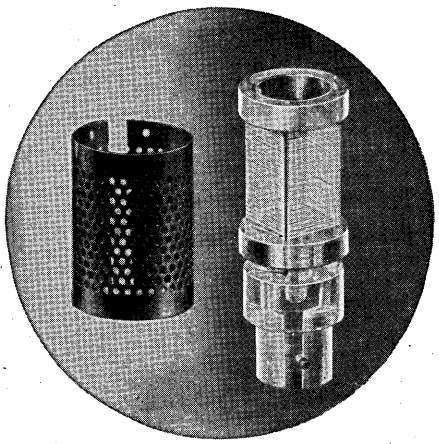
HYGROMETERS

" Gregory " Electrolytic Type

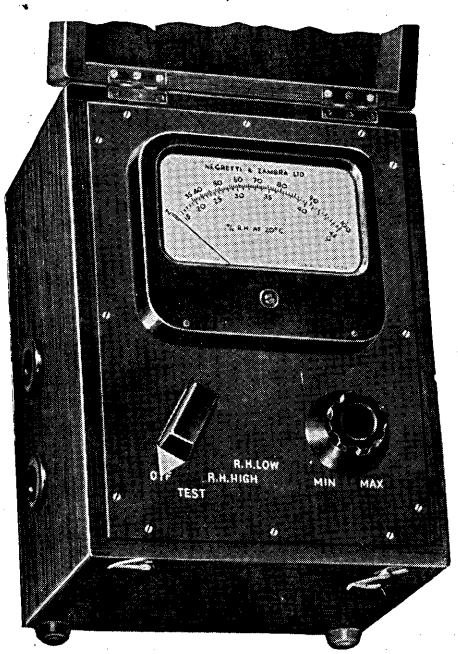
THE **standard element** illustrated on this page is fitted with a small bayonet cap male adaptor and is suitable for most industrial applications ; it can also be mounted in a Stevenson's Screen, installed within an air duct or incorporated into a fitting for use under high pressure.

It is suitable for temperature up to 122° F. (50° C.). Special elements are available for use up to 212° F. (100° C.).

The circuit employs alternating current of standard frequency in order to overcome the effects of polarisation. This is normally obtained from A.C. mains and a special voltage reducing and stabilising unit is supplied to smooth out variations in the mains supply voltage.



The Portable Indicator may also be supplied for use off a 12 volt battery where no mains supply is available. In both instruments the voltage is adjusted to a standardising point before a reading is taken. The scale is calibrated in percentage relative humidity at 20° C. and a temperature correction chart is provided to enable true readings to be obtained at other temperatures.



N.B. Indicators, Recorders and Controllers are covered by our standard two years' guarantee, but the elements are excluded since their effective life varies with conditions from 4 to 12 months, impending failure being shown usually by discoloration of the electrodes or fibres.

Elements are usually supplied with the perforated guard illustrated; but where the atmosphere is dust laden or otherwise polluted an additional porous covering is provided on request, by adding suffix 1P to the instrument or element catalogue number when ordering.

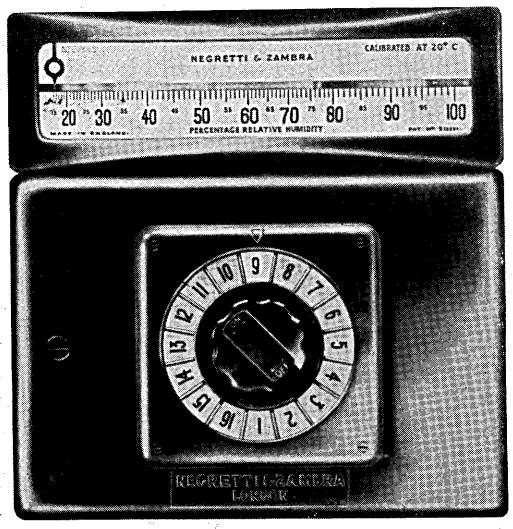
H. 390 PORTABLE GREGORY HUMIDITY INDICATOR, dual range **15/45** and **35/100** per cent Relative Humidity. Mounted in wooden case as illustrated and complete with one element. Suitable for operation off 200/250 volts A.C. supply or 12 volts D.C. supply, please state type required.

H. 600 Spare elements, see separate price list. Reconditioning service, cost per element, also shown on price list.

SPECIFY NEGRETTI AND ZAMBRA

HYGROMETERS

" Gregory " Electrolytic Type : Indicating



SINGLE and MULTIPOINT INDICATORS may be supplied for use with Gregory Elements suitable for projection or flush panel mounting. These can have either a 6 inch or 10 inch engraved scale range 9/50 per cent* or 15/100 per cent R.H., knife edge pointer and anti-parallax mirror ; the former is fitted with a rotary wipe action type switchbox and the latter with mercury tube contact switches. Mounted in moisture and fume-proof case of die-cast aluminium alloy, heavily enamelled black and stoved ; complete with **voltage reducing** and **stabilising unit** for use on 200/250 volts A.C. mains and one **Gregory element** for each point.

* *This range is suitable for particularly low humidities, the scale being contracted with* 20 *per cent. R.H. approximately central.*

H. 650 6 inch scale single point Gregory Humidity indicator as described above.

Multipoint instruments may be supplied with up to 10 points.

H. 1100 10 inch scale single point Gregory Humidity Indicator as described above.

Multipoint instruments may be supplied with up to 31 points

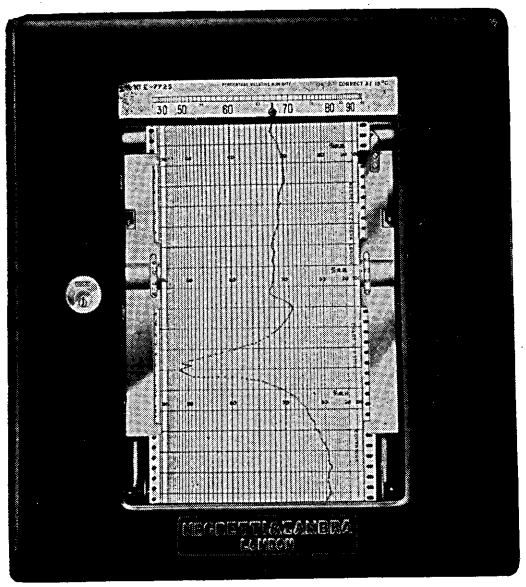
E. 1036 Internally illuminated translucent scale and switch index (Multi-point 10").

E. 620 Ditto, Scales only for single point 10" and all 6" Indicators.

For spare Gregory Elements see page 31

HYGROMETERS

" Gregory " Electrolytic Type : Recording



WHERE A RECORD of humidity is required a CONTINUOUS CHART RECORDER can be employed to give 1, 2, 3 or 4 separate records on the same chart.

H. 1311 GREGORY HUMIDITY RECORDER range 10/60 per cent or 20/100 per cent R.H. mounted in moisture and fume-proof case of die-cast aluminium alloy heavily enamelled black and stoved ; suitable for projection or flush panel mounting. With 5 inch illuminated scale and 50 ft. chart, speed ½ inch per hour, visible portion 18 hours, duration 50 days or 2 inches per hour, visible portion 4½ hours duration 12½ days. Mechanism arranged for synchronous motor drive from 200/250 volts A.C. supply and incorporating special **voltage reducing** and **stablising unit** and one **Gregory element.**

* *This range is suitable for particularly low humidities, the scale being contracted with* 20 *per cent. R.H. approximately central.*

H. 1312 As above but arranged to give **two** records and complete with **two** Gregory elements.

H. 1313 As above but for **three** records and with **three** elements.

H. 1314 As above but for **four** records and with **four** elements.

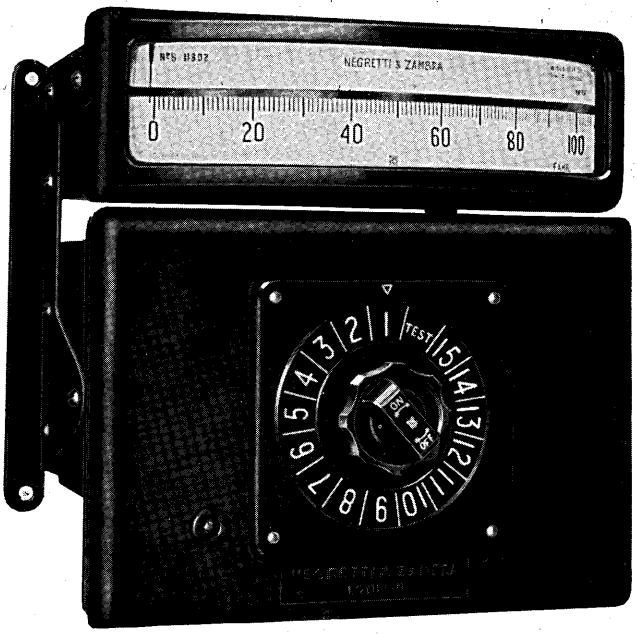
E. 595 TRANSFORMER to enable the above to be operated from 110 volts A.C. supply.

For spare Gregory Elements see page 31

GUARANTEED FOR TWO YEARS

HYGROMETERS

Electrical Resistance Type : Indicating



THE 10 INCH SCALE MULTIPOINT RESISTANCE INDICATOR may be used in conjunction with any of the wet and dry bulb fittings described on page 36, and readings of each bulb must be taken separately. The Relative Humidity can then be found from tables.

Mounted in moisture and fume-proof die-cast case of aluminium alloy heavily enamelled black and stoved ; suitable for projection or flush panel mounting. With knife edge pointer and anti-parallax mirror and rotary selector switch-box fitted with mercury tube contacts tipping through 90°. Complete with two accumulators.

No.		
*E/1102	ELECTRICAL RESISTANCE INDICATING HYGROMETER for one pair of wet and dry resistance elements.	
*E/1104	Ditto, two pairs	
E/1106	Ditto, three „	
E/1112	Ditto, six „	
E/1115	Ditto, seven pairs	
	*With push button switches.	Ranged as required.

A 6 inch scale type is also available fitted with a rotary wipe action switchbox instead of the mercury tube type described above. Prices on request.

E/414 3/·029″ Connecting Cable 3-core braided.
E/415 3/·029″ Ditto 3-core braided and lead covered.

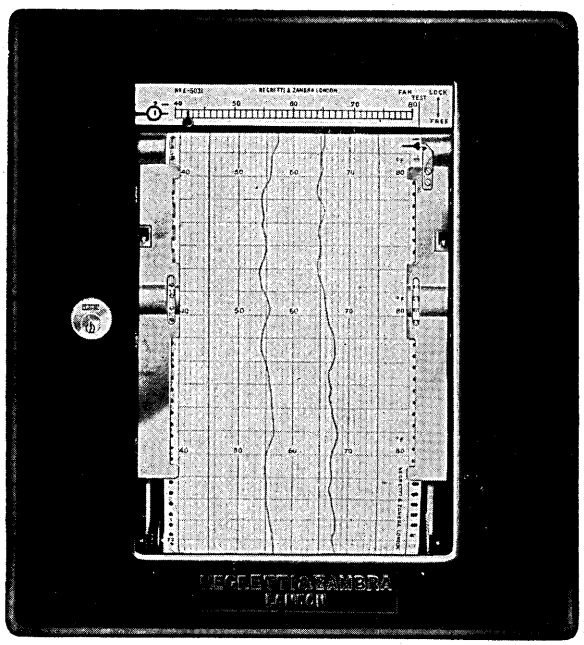
E/250 Mains unit may be supplied if required in place of accumulators to enable the resistance circuits to be operated from 200/250 volts A.C. supply at an additional charge.

For Wet and Dry Resistance Elements see page 36.

Electrical Resistance Type : Recording

ELECTRICAL RESISTANCE RECORDING HYGROMETER, fitted with a double pivoted moving coil system, and mercury-in-glass switches, tilting through 90° ensuring positive action. The chart is 5 in. wide and 50 ft. long ; its duration is 50 days at ½″ per hour or 12½ days at 2 in. per hour.

The recorder is operated from 200/250 volts A.C. supply (not available for clockwork drive). The mechanism is hinged to swing outwards, permitting easy access to all parts. Moisture and fume-proof case of die-cast aluminium alloy heavily enamelled black and stoved ; suitable for projection or flush panel mounting. Complete with two accumulators.



No.	
E/1312	ELECTRICAL RESISTANCE RECORDING HYGROMETER for one pair of Wet and Dry Resistance Elements.
E/1314	Ditto for two pairs.
	Spare Chart rolls with 2-colour or 4-colour inked ribbon ; see separate price list.

E/414 3/·029″ Connecting Cable 3-core braided.

E/415 3/·029″ Ditto 3-core braided and lead covered.

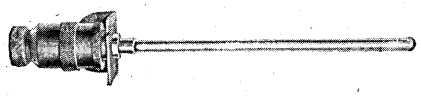
E/250 Mains unit may be supplied if required in place of accumulators to enable the resistance circuits to be operated from 200/250 volts A.C. supply at an additional charge.

E/595 Transformer for use on 110 volts A.C. supply.

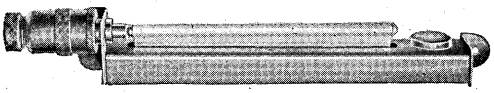
For Wet and Dry Resistance Elements see page 36.

HYGROMETERS

Wet and Dry Bulb Fittings : Electrical

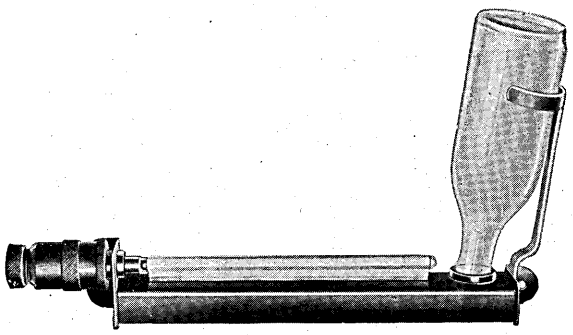


Dry Bulbs for E/449, E/495, E/451



E/449

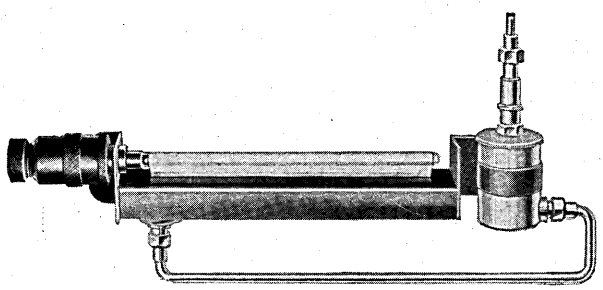
E/449
Wet and Dry Resistance Elements; two nickel coils, protected by tinned copper tubes, $\frac{3}{8}$″ diameter × 10″; brass terminal heads; watertight cable glands. Brackets for wall fixing, with wick and trough 16″ × 5″ × 2″.



E/495

E/495
Ditto, with bottle for water feed.

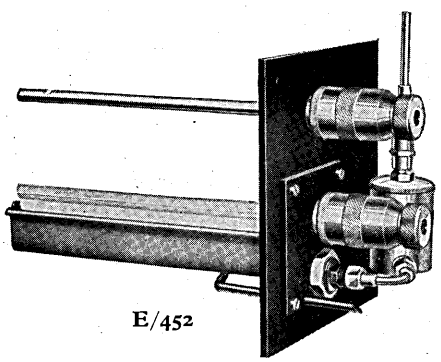
E/451
As E/449, with provision for continuous irrigation and constant water level. A float chamber is provided and is connected to the trough; with 10 ft. of pipe.



E/451

E/452
Wet and Dry Resistance Elements for ducts having air speeds up to approximately 2,000 f.p.m.; metal plate 8″ × 8″, wick, water trough, and float chamber. Length 13$\frac{5}{8}$″.

E/496
As E/452, but with water tank 12″ × 4$\frac{1}{8}$″ × $\frac{1}{2}$″ connected by copper tubing to the trough.



E/452

E/497
As E/452, arranged for small supply of steam condensate, regulated by a needle valve, and passed through a copper cooling coil, ensuring a continuous supply of distilled water.

GUARANTEED FOR TWO YEARS

HYGROMETERS

Wet and Dry Bulb Tables : Ventilated

The tables mentioned on page 4 for use with ventilated or aspirated wet and dry bulb Hygrometers are available in pocket form, printed on celluloid, and supplied complete with leatherette case.

Fahrenheit Scale

20° F. to 120° F.

100° F. to 212° F.

Centigrade Scale

−5° C. to 50° C.

30° C. to 100° C.

RELATIVE PERCENTAGE HUMIDITY FOR VENTILATED WET & DRY BULB THERMOMETERS.

DEPRESSION OF WET BULB.

DRY BULB READINGS CENTIGRADE °C	0·5 1·0 1·5	2·0 2·5 3·0 3·5	4·0 4·5 5·0 5·5	6·0 6·5 7·0 7·5	8·0 8·5 9·0 9·5 10·0
-5·0	84 72 61	49 38 27			
-4·5	84 73 62	51 40 29			
-4·0	85 74 63	52 42 31			
-3·5	86 75 64	54 43 33			
-3·0	87 76 65	55 45 35			
-2·5	87 77 67	57 47 37 27			
-2·0	88 78 68	58 48 39 29			
-1·5	89 79 69	59 50 40 31			
-1·0	89 80 70	61 51 42 33	24		
-0·5	90 81 71	62 53 44 35	28		
0	91 81 72	63 54 46 37	28		
0·5	91 82 73	64 56 47 39	30 22		
1·0	91 83 74	65 57 49 40	32 24		
1·5	92 83 75	67 58 50 42	34 26		
2·0	92 84 76	68 60 51 44	36 28		
2·5	92 84 76	68 61 53 45	38 30		
3·0	92 84 77	69 62 54 47	39 32 24		
3·5	92 85 77	70 62 55 48	41 34 27		
4·0	92 85 78	70 63 56 49	42 35 28		
4·5	93 85 78	71 64 57 50	44 37 30 23		
5·0	93 86 79	72 65 58 51	45 38 32 25		
5·5	93 86 70	72 66 59 52	46 39 33 27		
6·0	93 86 79	73 66 60 53	47 41 35 29	23	
6·5	93 86 80	73 67 60 54	48 42 36 30	24 18	
7·0	93 87 80	74 67 61 55	48 43 37 31	26 20 14	
7·5	93 87 81	74 68 62 56	50 44 38 33	27 22 16	
8·0	94 87 81	75 69 63 57	51 45 40 34	29 23 18	
8·5	94 87 81	75 69 63 58	52 46 41 35	30 25 19 14	
9·0	94 88 82	76 70 64 58	53 47 42 36	31 26 21 16	
9·5	94 88 82	76 70 65 59	54 48 43 38	32 27 22 17	
10·0	94 88 82	76 71 65 60	54 49 44 39	34 28 24 19	14
10·5	94 88 83	77 71 66 60	55 50 45 40	35 30 25 20	15
11·0	94 88 83	77 72 66 61	56 51 46 41	36 31 26 22	17
11·5	94 89 83	78 72 67 62	57 52 47 42	37 32 28 23	19 4
12·0	94 89 83	78 73 68 62	57 53 48 43	38 33 29 24	20 15
12·5	94 89 84	78 73 68 63	58 53 49 44	39 35 30 26	21 17
13·0	95 89 84	79 74 69 64	59 54 49 45	40 36 31 27	23 18 14
13·5	95 89 84	79 74 69 64	60 55 50 46	41 37 32 28	24 20 16
14·0	95 90 84	79 74 70 65	60 56 51 46	42 38 33 29	25 21 17
14·5	95 90 85	80 75 70 65	61 56 52 47	43 39 35 30	26 22 18 14

EST 1850

RELATIVE PERCENTAGE HUMIDITY CONTINUED.

DEPRESSION OF WET BULB.

DRY BULB READINGS CENTIGRADE °C	0·5 1·0 1·5	2·0 2·5 3·0 3·5	4·0 4·5 5·0 5·5	6·0 6·5 7·0 7·5	8·0 8·5 9·0 9·5 10·0
15·0	95 90 85	80 75 71 66	61 57 52 48	44 40 36 32	27 23 20 16 12
15·5	95 90 85	80 76 71 66	62 58 53 49	45 41 37 32	29 25 21 17 13
16·0	95 90 85	81 76 71 67	63 58 54 50	46 42 37 34	30 26 22 18 15
16·5	95 90 86	81 76 72 67	63 59 55 50	46 42 38 34	31 27 23 20 16
17·0	95 90 86	81 77 72 68	64 59 55 51	47 43 39 36	32 28 24 21 17
17·5	95 91 86	81 77 73 68	64 60 56 52	48 44 40 36	33 29 25 22 19
18·0	95 91 86	82 77 73 69	65 61 56 53	49 45 41 37	34 30 27 23 20
18·5	95 91 86	82 78 73 69	65 61 57 53	49 46 42 38	35 31 28 24 21
19·0	95 91 86	82 78 74 70	66 62 58 54	50 46 43 39	36 32 29 25 22
19·5	95 91 87	82 78 74 70	66 62 58 54	51 47 43 40	36 33 30 26 23
20·0	96 91 87	83 78 74 70	66 63 59 55	51 48 44 41	37 34 30 27 24
21·0	96 91 87	83 79 75 71	67 64 60 56	53 49 46 42	39 36 32 29 26
22·0	96 92 88	84 80 76 72	68 64 61 57	54 50 47 44	40 37 34 31 28
23·0	96 92 88	84 80 76 72	69 65 62 58	55 51 48 45	42 39 36 33 30
24·0	96 92 88	84 80 77 73	70 66 63 59	56 53 49 46	43 40 37 34 31
25·0	96 92 88	84 81 77 74	70 67 63 60	57 54 50 47	44 41 38 35 33
26·0	96 92 88	85 81 78 74	71 67 64 61	58 55 52 48	46 43 40 37 34
27·0	96 92 89	85 81 78 75	71 68 65 62	58 55 52 50	47 44 41 38 36
28·0	96 93 89	85 82 78 75	72 68 65 62	59 56 53 50	48 45 42 40 37
29·0	96 93 89	86 82 79 76	72 69 66 63	60 57 54 51	49 46 43 41 38
30·0	96 93 89	86 83 79 76	73 70 67 64	61 58 55 52	50 47 44 42 39
31·0	96 93 90	86 83 80 77	73 70 67 64	62 59 56 53	50 48 45 43 40
32·0	96 93 90	86 83 80 77	74 71 68 65	62 60 57 54	51 49 46 44 41
33·0	96 93 90	87 83 80 77	74 71 69 66	63 60 58 55	52 50 47 45 42
34·0	96 93 90	87 84 81 78	75 72 69 66	64 61 58 56	53 51 48 46 43
35·0	96 93 90	87 84 81 78	75 72 69 66	64 61 59 56	54 51 49 47 44
36·0	96 93 90	87 84 81 78	75 72 69 67	64 62 59 57	55 52 50 48 45
37·0	96 93 90	87 85 82 79	76 73 70 67	65 62 60 57	55 53 51 48 46
38·0	96 93 90	87 85 82 79	76 73 70 68	65 63 60 58	56 53 51 49 46
39·0	96 93 90	87 85 82 79	77 74 71 68	66 63 61 58	56 54 52 49 47
40·0	97 94 91	88 85 82 79	77 74 71 69	66 64 61 59	57 54 52 50 48
41·0	97 94 91	88 86 83 80	78 75 72 70	67 65 62 60	57 55 53 51 49
42·0	97 94 91	88 86 83 80	78 75 72 70	67 65 63 60	58 55 53 51 49
43·0	97 94 91	88 86 83 80	78 75 73 70	68 65 63 61	58 56 54 52 50
44·0	97 94 91	89 86 83 81	78 76 73 71	69 66 64 62	59 57 55 53 51
45·0	97 94 91	89 86 83 81	79 76 74 71	69 66 64 62	60 58 56 54 52
46·0	97 95 92	89 87 84 81	79 76 74 71	69 66 64 62	60 58 56 54 52
47·0	97 95 92	89 87 84 81	79 76 74 71	69 67 65 63	61 59 57 55 53
48·0	97 95 92	89 87 84 81	79 76 74 71	69 67 65 63	61 59 57 55 53
49·0	97 95 92	89 87 84 81	79 77 74 72	70 68 66 64	62 60 58 56 54
50·0	97 95 92	89 87 84 82	80 77 75 72	70 68 66 64	62 60 58 56 54

NEGRETTI & ZAMBRA, LONDON. No 1489

On the following pages, 38—40, Fahrenheit Tables are printed, range 20° F. to 212° F.

For the non-ventilated type of wet and dry bulb hygrometer, i.e. where there is no artificial current of air passing the bulbs, the Meteorological Office Tables (M.O. 265) should be used.

HYGROMETERS

Wet and Dry Bulb Tables (Ventilated)

DEPRESSION OF WET BULB

DRY BULB READINGS °F

°F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
						PERCENTAGE RELATIVE HUMIDITY														
20	85	70	55	40	26	12	0													
21	85	71	56	42	28	15	1	0												
22	86	71	58	44	31	17	4	0												
23	86	72	59	46	33	20	7	0												
24	87	73	60	47	35	22	10	0												
25	87	74	62	49	37	25	13	1	0											
26	87	75	63	51	39	27	16	4	0											
27	88	76	64	52	41	29	18	7	0											
28	88	76	65	54	43	32	21	10	0											
29	88	77	66	55	44	34	23	13	3	0										
30	89	78	67	56	46	36	26	16	6	0										
31	89	78	68	58	47	37	28	18	8	0										
32	89	79	69	59	49	39	30	20	11	2	0									
33	90	80	70	60	51	41	32	23	14	5	0									
34	90	81	71	62	52	43	34	25	16	8	0									
35	91	81	72	63	54	45	36	27	19	10	2	0								
36	91	82	73	64	55	46	38	29	21	13	5	0								
37	91	83	74	65	57	48	40	31	23	15	7	0								
38	91	83	75	66	58	50	42	33	25	17	10	2	0							
39	92	83	75	67	59	51	43	35	27	20	12	5	0							
40	92	83	75	68	60	52	45	37	29	22	15	7	0							
41	92	84	76	69	61	54	46	39	31	24	17	10	3	0						
42	92	85	77	69	62	55	47	40	33	26	19	12	5	0						
43	92	85	77	70	63	55	48	42	35	28	21	14	8	1	0					
44	93	85	78	71	63	56	49	43	36	30	23	16	10	4	0					
45	93	86	78	71	64	57	51	44	38	31	25	18	12	6	0					
46	93	86	79	72	65	58	52	45	39	32	26	20	14	8	2	0				
47	93	86	79	72	66	59	53	46	40	34	28	22	16	10	5	0				
48	93	86	79	73	66	60	54	47	41	35	29	23	18	12	7	1	0			
49	93	86	80	73	67	61	54	48	42	36	31	25	19	14	9	3	0			
50	93	87	80	74	67	61	55	49	43	38	32	27	21	16	10	5	0			
51	94	87	81	75	68	62	56	50	45	39	34	28	23	17	12	7	2	0		
52	94	87	81	75	69	63	57	51	46	40	35	29	24	19	14	9	4	0		
53	94	87	81	75	69	63	58	52	47	41	36	31	26	20	16	10	6	1	0	
54	94	88	82	76	70	64	59	53	48	42	37	32	27	22	17	12	8	3	0	
55	94	88	82	76	70	65	59	54	49	43	38	33	28	23	19	14	9	5	0	
56	94	88	82	76	71	65	60	55	50	44	39	34	30	25	20	16	11	7	2	0
57	94	88	82	77	71	66	61	55	50	45	40	35	31	26	22	17	13	8	4	0
58	94	88	83	77	72	66	61	56	51	46	41	37	32	27	23	18	14	10	6	1
59	94	89	83	78	72	67	62	57	52	47	42	38	33	29	24	20	16	11	7	3
60	94	89	83	78	72	68	63	58	53	48	43	39	34	30	26	21	17	13	9	5

HYGROMETERS

Wet and Dry Bulb Tables (Ventilated)

DEPRESSION OF WET BULB

DRY BULB READINGS °F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	PERCENTAGE RELATIVE HUMIDITY																			
61	94	89	84	78	73	68	63	58	54	49	44	40	35	31	27	22	18	14	10	7
62	94	89	84	79	74	69	64	59	54	50	45	41	36	32	28	24	20	16	12	8
63	95	89	84	79	74	69	64	60	55	50	46	42	37	33	29	25	21	17	13	10
64	95	90	84	79	74	70	65	60	56	51	47	43	38	34	30	26	22	18	15	11
65	95	90	85	80	75	70	66	61	56	52	48	44	39	35	31	27	24	20	16	12
66	95	90	85	80	75	71	66	61	57	53	48	44	40	36	32	29	25	21	17	14
67	95	90	85	80	75	71	66	62	58	53	49	45	41	37	33	30	26	22	19	15
68	95	90	85	80	76	71	67	62	58	54	50	46	42	38	34	31	27	23	20	16
69	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	32	28	24	21	18
70	95	90	86	81	77	72	68	64	59	55	51	48	44	40	36	33	29	25	22	19
71	95	90	86	81	77	72	68	64	60	56	52	48	45	41	37	33	30	27	23	20
72	95	91	86	82	77	73	69	65	61	57	53	49	45	42	38	34	31	28	24	21
73	95	91	86	82	78	73	69	65	61	57	53	50	46	42	39	35	32	29	25	22
74	95	91	86	82	78	74	69	65	61	58	54	50	47	43	39	36	33	29	26	23
75	96	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24
76	96	91	87	82	78	74	70	66	62	59	55	51	48	44	41	38	34	31	28	25
77	96	91	87	83	79	74	71	67	63	59	56	52	48	45	42	39	35	32	29	26
78	96	91	87	83	79	75	71	67	63	60	56	53	49	46	43	39	36	33	30	27
79	96	91	87	83	79	75	71	68	64	60	57	53	50	46	43	40	37	34	31	28
80	96	91	87	83	79	75	72	68	64	61	57	54	50	47	44	41	38	35	32	29
82	96	92	88	84	80	76	72	69	65	61	58	55	51	48	45	42	39	36	33	30
84	96	92	88	84	80	76	73	69	66	62	59	56	52	49	46	43	40	37	35	32
86	96	92	88	84	81	77	73	70	66	63	60	57	53	50	47	44	42	38	36	33
88	96	92	88	85	81	77	74	70	67	64	61	57	54	51	48	46	43	40	37	35
90	96	92	89	85	81	78	74	71	68	65	61	58	55	52	49	47	44	41	39	36
92	96	92	89	85	82	78	75	72	68	65	62	59	56	53	50	48	45	42	40	37
94	96	93	89	85	82	79	75	72	69	66	63	60	57	54	51	49	46	43	41	38
96	96	93	89	86	82	79	76	73	69	66	63	61	58	55	52	50	47	44	42	39
98	96	93	89	86	83	79	76	73	70	67	64	61	58	56	53	50	48	45	43	40
100	96	93	89	86	83	80	77	73	70	68	65	62	59	56	54	51	49	46	44	41
102	96	93	90	86	83	80	77	74	71	68	65	62	60	57	55	52	49	47	45	42
104	97	93	90	87	83	80	77	74	71	69	66	63	60	58	55	53	50	48	46	43
106	97	93	90	87	84	81	78	75	72	69	66	64	61	58	56	53	51	49	46	44
108	97	93	90	87	84	81	78	75	72	70	67	64	62	59	57	54	52	49	47	45
110	97	93	90	87	84	81	78	75	73	70	67	65	62	60	57	55	52	50	48	46
112	97	94	90	87	84	81	79	76	73	70	68	65	63	60	58	55	53	51	49	47
114	97	94	91	88	85	82	79	76	74	71	68	66	63	61	58	56	54	52	49	47
116	97	94	91	88	85	82	79	76	74	71	69	66	64	61	59	57	54	52	50	48
118	97	94	91	88	85	82	79	77	74	72	69	67	64	62	59	57	55	53	51	49
120	97	94	91	88	85	82	80	77	74	72	69	67	65	62	60	58	55	53	51	49

GUARANTEED FOR TWO YEARS

HYGROMETERS

Wet and Dry Bulb Tables (Ventilated)

DEPRESSION OF WET BULB

°F	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78
	PERCENTAGE RELATIVE HUMIDITY																																						
122	94	89	83	77	72	67	62	58	53	49	45	42	38	*35*	*32*	*29*	*26*	*23*	*20*	*18*	*15*	*13*	*10*	*8*	*6*														
124	94	89	83	77	72	67	63	58	54	50	46	42	*39*	*36*	*33*	*30*	*27*	*24*	*21*	*18*	*16*	*14*	*11*	*9*	*7*	*5*													
126	94	89	83	78	72	68	63	59	54	50	47	43	39	*37*	*33*	*30*	*27*	*25*	*22*	*19*	*17*	*15*	*12*	*10*	*8*	*6*													
128	94	89	83	78	73	68	64	59	55	51	47	44	40	*37*	*34*	*31*	*28*	*25*	*23*	*20*	*18*	*16*	*13*	*11*	*9*	*7*	*5*												
130	95	89	84	78	73	69	64	60	55	52	48	44	41	*38*	*35*	*32*	*29*	*26*	*24*	*21*	*19*	*16*	*14*	*12*	*10*	*8*	*6*	*5*											
132	95	89	84	78	73	69	65	60	56	52	49	45	42	*39*	*36*	*33*	*30*	*27*	*24*	*22*	*20*	*17*	*15*	*13*	*11*	*9*	*7*	*6*											
134	95	89	84	79	74	69	65	61	56	53	49	46	42	*39*	*36*	*33*	*30*	*28*	*25*	*23*	*20*	*18*	*16*	*14*	*12*	*10*	*8*	*6*	*5*										
136	95	89	84	79	74	70	66	61	57	53	50	47	43	*40*	*37*	*34*	*31*	*28*	*26*	*23*	*21*	*19*	*17*	*15*	*13*	*11*	*9*	*7*	*6*										
138	95	90	84	79	74	70	66	62	57	54	51	47	44	*40*	*37*	*35*	*32*	*29*	*27*	*24*	*22*	*20*	*17*	*15*	*14*	*12*	*10*	*8*	*7*	*5*									
140	95	90	85	79	75	71	66	62	58	55	51	48	45	42	39	36	33	30	27	25	23	20	*18*	*16*	*14*	*12*	*11*	*9*	*7*	*6*									
142	95	90	85	80	75	71	67	63	58	55	52	49	45	42	39	36	33	30	28	26	23	21																	
144	95	90	85	80	75	71	67	63	59	56	52	49	46	43	40	37	34	31	29	26	24	22																	
146	95	90	85	80	76	72	67	63	59	56	53	50	46	43	40	37	35	32	29	27	25	22																	
148	95	90	85	80	76	72	68	64	60	57	53	50	47	44	41	38	35	32	30	28	25	23																	
150	95	90	85	81	76	72	68	64	60	57	54	51	47	44	41	39	36	33	31	28	26	24																	
152	95	90	86	81	76	72	69	65	61	57	54	51	48	45	42	39	36	33	31	29	27	24																	
154	95	90	86	81	77	73	69	65	61	58	55	52	48	45	43	40	37	34	32	30	27	25																	
156	95	91	86	81	77	73	69	65	62	58	55	52	49	46	43	40	38	35	32	30	28	26																	
158	95	91	86	81	77	73	70	66	62	59	56	53	49	47	44	41	38	35	33	31	29	26	24	22	21	19	17												
160	95	91	86	82	77	74	70	66	62	59	56	53	50	47	44	41	39	36	34	31	29	27	25	23	21	19	17												
162	95	91	86	82	78	74	70	66	63	60	56	53	50	47	45	42	39	36	34	32	30	27	25	24	22	20	18												
164	95	91	86	82	78	74	70	67	63	60	57	54	51	48	45	42	40	37	35	32	30	28	26	24	22	20	19												
166	96	91	87	82	78	74	71	67	63	60	57	54	51	48	45	43	40	37	35	33	31	29	26	25	23	21	19												
168	96	91	87	82	78	75	71	67	64	61	57	54	51	48	46	43	41	38	36	33	31	29	27	25	23	22	20												
170	96	91	87	83	79	75	71	68	64	61	58	55	52	49	46	44	41	38	36	34	32	30	28	26	24	22	20												
172	96	91	87	83	79	75	72	68	64	61	58	55	52	49	47	44	41	39	37	35	32	30	28	26	25	23	21												
174	96	91	87	83	79	75	72	68	65	62	59	56	52	50	47	45	42	39	37	35	33	31	29	27	25	23	21												
176	96	92	87	83	79	76	72	69	65	62	59	56	53	50	48	45	42	40	38	36	33	31	29	27	26	24	22	20	19	17	16								
178	96	92	87	83	79	76	72	69	65	62	59	56	53	50	48	45	43	40	38	36	34	32	30	28	26	24	22	21	19	18	16								
180	96	92	87	83	79	76	72	69	66	62	59	56	53	51	48	46	43	41	38	36	34	32	30	28	26	25	23	21	20	18	17								
182	96	92	88	83	80	76	73	69	66	63	60	57	54	51	48	46	43	41	39	37	35	33	31	29	27	25	23	22	20	19	17								
184	96	92	88	84	80	76	73	69	66	63	60	57	54	51	49	46	44	41	39	37	35	33	31	29	27	26	24	22	21	19	18								
186	96	92	88	84	80	76	73	70	66	63	60	57	54	52	49	47	44	42	40	38	35	33	31	29	28	26	24	23	21	20	18								
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192	96	92	88	84	80	77	74	70	67	64	61	58	55	52	50	48	45	43	41	39	37	35	33	31	29	27	26	24	23	21	20								
194	96	92	88	84	81	77	74	71	67	64	61	58	55	53	50	48	46	43	41	39	37	35	33	31	30	28	26	25	23	22	20	19	18	17	16	14	13	12	11
196	96	92	88	84	81	77	74	71	67	64	62	59	56	53	51	48	46	43	41	39	37	35	33	32	30	28	26	25	23	22	21	19	18	17	16	15	14	12	11
198	96	92	88	84	81	77	74	71	68	65	62	59	56	53	51	48	46	44	42	40	38	35	34	32	30	28	27	25	24	22	21	20	18	17	16	15	14	13	12
200	96	92	88	84	81	78	74	71	68	65	62	59	56	53	51	49	46	44	42	40	38	36	34	32	30	29	27	26	24	23	21	20	19	18	16	15	14	13	12
202	96	92	88	84	81	78	74	71	68	65	62	59	56	54	51	49	47	44	42	40	38	36	34	32	31	29	27	26	25	23	22	20	19	18	17	15	14	13	12
204	96	92	88	85	81	78	75	71	68	65	62	59	56	54	52	49	47	45	43	40	38	36	34	33	31	29	28	26	25	23	22	21	19	18	17	16	15	14	12
206	96	92	88	85	81	78	75	72	68	65	63	60	57	54	52	50	47	45	43	41	39	36	35	33	31	30	28	27	25	24	22	21	20	19	17	16	15	14	13
208	96	92	89	85	81	78	75	72	69	66	63	60	57	54	52	50	48	45	43	41	39	37	35	33	32	30	28	27	26	24	23	21	20	19	18	16	15	14	13
210	96	92	89	85	81	78	75	72	69	66	63	60	57	55	52	50	48	46	44	41	39	37	35	34	32	30	29	27	26	25	23	22	20	19	18	17	15	14	13
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°F	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78

DRY BULB READINGS

The Tables from 122° F. have been derived from the Centigrade Tables published by the courtesy of The Director of the National Physical Laboratory The figures in italics are extrapolated.

HYGROMETERS

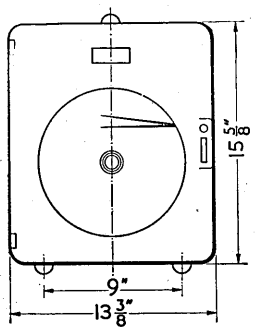
Weights

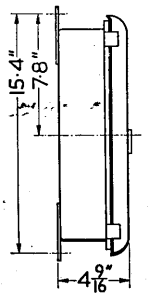
No.		lb.	kg.
5586/8		1¾	0.8
5569/72		1	.46
5574/79		1	.46
5630a		¾	.35
5630b		3¼	1.47
5630c		4¾	2.14
DH.10		2½	1.13
DH.12		2½	1.13
5607/8		1	.45
5615/8		1¼	.57
5619/22		5	2.27
5667		2½	1.13
5668		2½	1.12
PH/1		¾	.33
5671		3	1.36
5674		3	1.36
R/116		10	4.54
R/152		9	4.08
R/152D		9	4.08
R/153		9	4.08
R/153D		9	4.08
5669/70		9¾	4.43
5672/3		9¾	4.43
5675		15	6.80
5633/6		8½	3.85
5639		31	14.1
T/332 4″	TT/228	12¾	5.8
	230	12½	5.7
	231	11¼	5.1
	232	11¾	5.3
	242	12¾	5.8
	244	14¾	6.7
6″	228	16¼	7.4
	230	16	7.3
	231	14¾	6.7
	232	15¼	6.8
	242	16¼	7.4
	244	18¼	8.5

No.		lb.	kg.
T/232 9″	TT/228	24¾	11.2
	230	24½	11.1
	231	23¼	10.5
	232	23¾	10.7
	242	24¾	11.2
	244	26¾	12.1
5653	TT/228	29¾	13.5
	230	30½	13.8
	231	28¼	12.8
	232	28¾	13.1
	242	30¾	14.0
	244	32¾	14.9
5645	TT/228	21¾	9.9
	230	22½	10.2
	231	20¼	9.2
	232	20¾	9.4
	242	22¾	10.3
	244	24¾	11.2
5649	TT/228	34¾	15.8
	230	35½	16.1
	231	33¼	15.1
	232	33¾	15.3
	242	35¾	16.2
	244	37¾	17.1
H.390		13¾	6.3
H.650		6	2.7
„ (Multipoint)		16½	7.5
H.1100		20	9.1
„ (Multipoint)		42	19.1
H.1311/14		41	18.60
E/1102/1115		42	19.10
E/242		7¼	3.30
E/595		4½	2.04
E/1312		41	18.60
E/1314		41	18.60

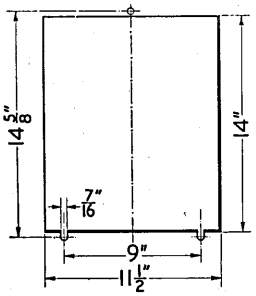
HYGROMETERS

Dimensions

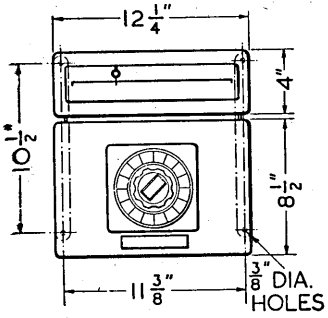


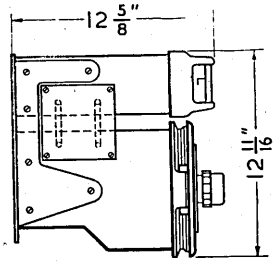


5653 : Projection mounted. Three fixing holes $\frac{5}{16}$" diameter.

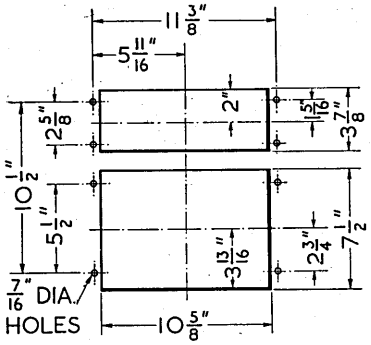


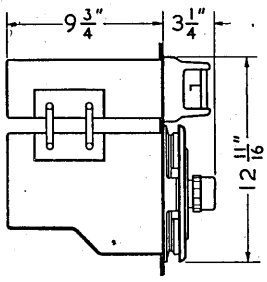
5653 : Flush panel mounted.



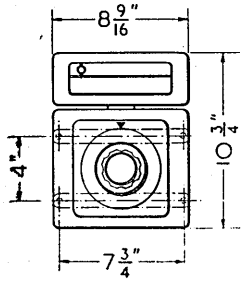


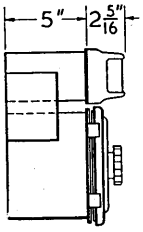
E1102. E1104. E1106. E1112. E1115.
Projection mounted.



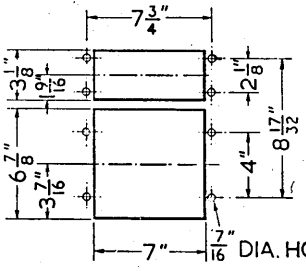


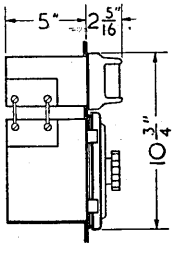
E1102. E1104. E1106. E1112. E1115.
Flush panel mounted.





Projection mounted.





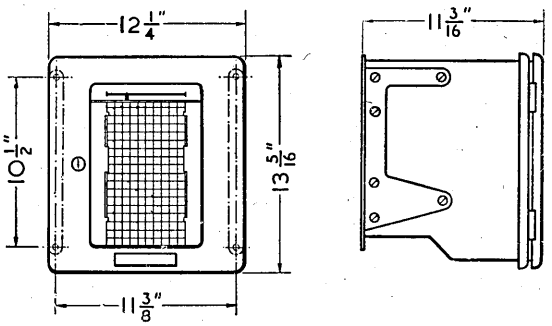
Flush panel mounted

6" Multipoint Electric Resistance Hygrometers
6" „ Gregory Electrolytic „ H650

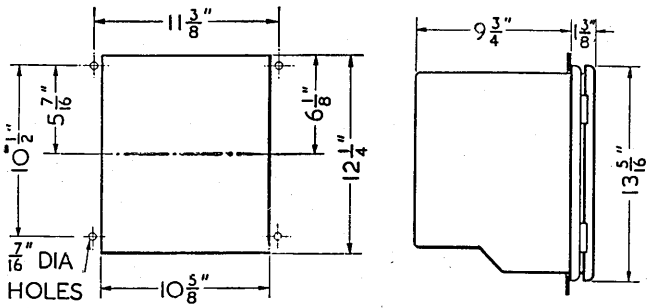
GUARANTEED FOR TWO YEARS

HYGROMETERS

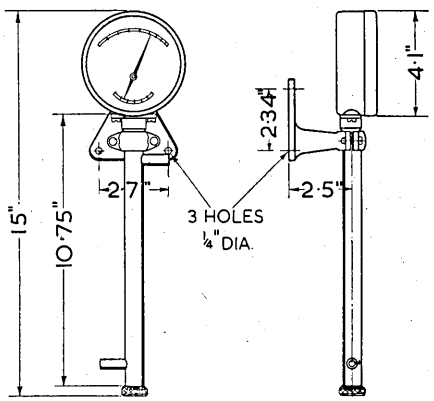
Dimensions



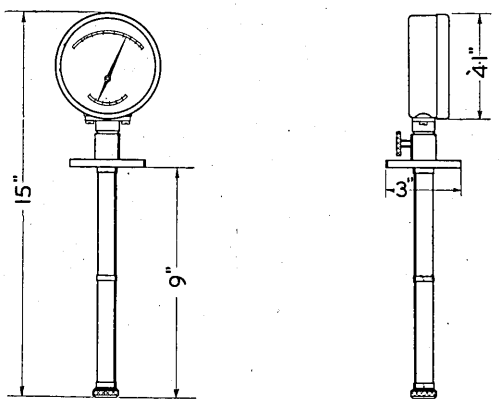
E1312-E1314. H1311-H1314. Projection mounted. 4 fixing holes 5/16" diameter.



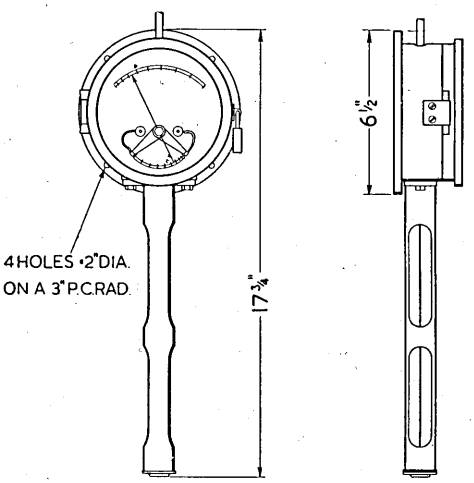
E1312-E1314. H1311-H1314. Flush panel mounted.



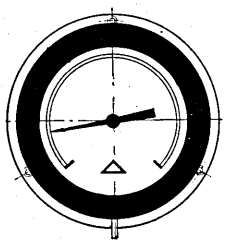
5667, 5668, 5671



5674

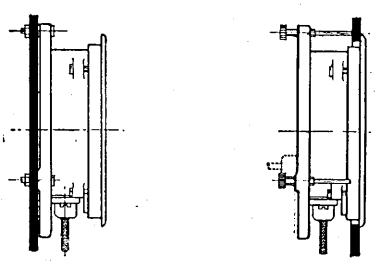


R116.



4" and 6": Clearance for 2 B.A., 3/16" Whit. or No. 9 Woodscrews. 9": Clearance for 0 B.A., ¼" Whit. or No. 14 Woodscrews.

T332.



	4"	6"	9"
Diameter overall	5½"	7¼"	11"
Length of scale	8"	11"	17½"
Dial Aperture	3.7"	5"	8.2"
Depth of Case	2¼"	2 5/16"	3⅞"
Panel Opening	4¾"	6¼"	9⅞"
3 fixing holes; P.C.D.	5"	6¾"	10¼"

SPECIFY NEGRETTI AND ZAMBRA

A RESEARCH LABORATORY

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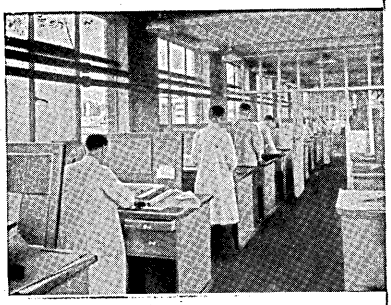
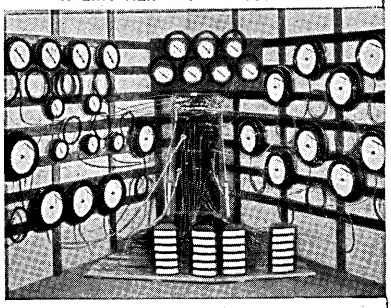
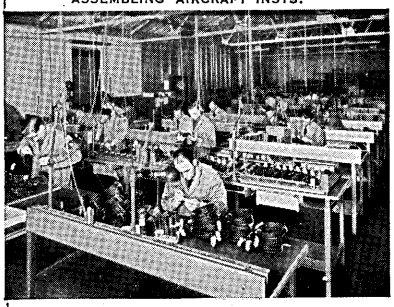


ASSEMBLING ELECTRICAL INSTS.

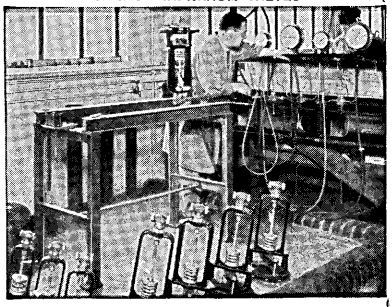
AGEING MERCURY-IN-STEEL INSTS.



ASSEMBLING AIRCRAFT INSTS.



TESTING DIAPHRAGM VALVES



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