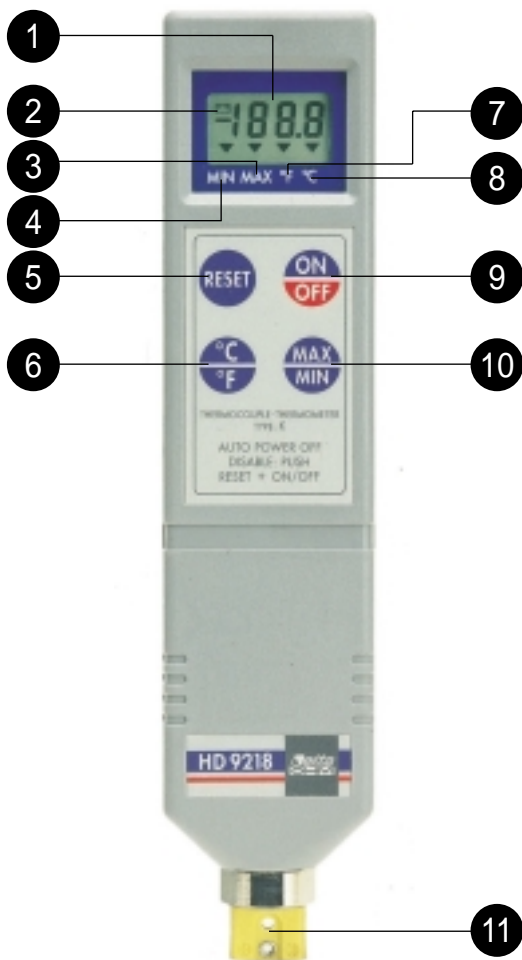


HD 9218

INSTRUCTIONS MANUAL



HD 9218










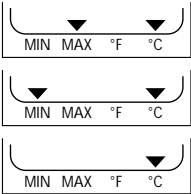

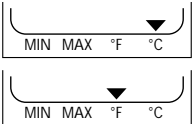
HD 9218

**MICROPROCESSOR CONTROLLED
DIGITAL THERMOMETER
FOR TYPE K THERMOCOUPLE**

ENGLISH

-
- 1 Display
 - 2 Low battery indication
 - 3 The value indicated on the display is the maximum value updated by the instrument
 - 4 The value indicated on the display is the minimum value updated by the instrument
 - 5 Reset key for resetting the maximum and minimum value
 - 6 Key for selecting the instrument reading in °C or °F
 - 7 The value indicated on the display is in °F
 - 8 The value indicated on the display is in °C
 - 9 ON/OFF key for switching the instrument on and off
 - 10 MAX/MIN key which when pressed shows alternately the maximum value, the minimum value and the updated current value
 - 11 Miniature socket for K thermocouple input

Key	Symbols lit besides the numbers	Description
	<p>All the symbols are lit for a few seconds after switching on.</p>	<p>Switches the instrument on and off. Press once to switch on; when it is pressed again it switches the instrument off. The instrument switches itself off automatically about 8 minutes after the ON/OFF key has been pressed. It is provided with an auto power off function.</p>
  	<p>The battery symbol flashes </p>	<p>If the RESET key is held down simultaneously with the ON/OFF key when switching on, the automatic cutout is disabled and power is supplied without interruption. To switch off, press the ON/OFF key.</p>
		<p>When the RESET key is pressed the MAX and MIN values are reset; from the moment that the key is pressed, the instrument begins to update and store the maximum and minimum values measured by the probe. The RESET key is used when enabling manual calibration and when storing calibration.</p>

Key	Symbols lit besides the numbers	Description
		<p>When the MAX/MIN key is pressed, the display shows alternately the updated maximum value, the updated minimum value and the current value; the ▼ symbol indicates the value displayed.</p>
		<p>When the key is pressed the display alternately shows the value of the measurement in °C or °F; the ▼ symbol indicates the unit chosen.</p>

Err

If the probe is not connected to the connector, or if there is a break in it, the Error signal appears.


PROBE CONNECTION

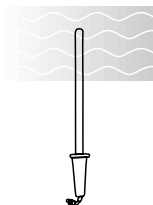
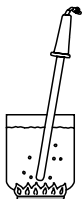
The HD 9218 thermometer may be fitted with all DELTA OHM type K thermocouple probes and with probes by other manufacturers as long as they are provided with a standard miniature connector.

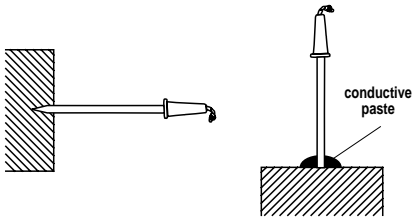
When connecting the probe, ensure that the connector is polarized.



HOW TO MEASURE

1. Press the ON/OFF key to switch on the instrument. This operation enables the automatic cutout function. If you wish power supply without automatic interruption, press the RESET and ON/OFF keys simultaneously. In this case the  symbol flashes. When the instrument is switched on all the numbers and symbols light up for a few moments.
2. Check display. After all the segments are lit, the value measured by the probe appears and the symbol indicating whether it is in °C or °F. If there is a break in the probe or if it is not properly connected, the Err signal appears. In this case check the sensor part or the connector.
3. The instrument is switched off by pressing the ON/OFF key.
4. The measurement is taken by placing the immersion probe at a depth of at least 10 times the diameter of the probe in the liquid of which you want to know the temperature (in fact it depends on the dimensions of the container and on where the temperature is to be read). In portable probes the cold junction of the thermocouple is generally earthed so as to have fast response times. Avoid contact with the sides or bottom of the container. To take measurements in air, the probe must be pointed in a transverse direction to the air flow; avoid contact with the walls. When taking penetration measurements the tip of the probe must be inserted at a depth of at least 10 times the diameter of the probe; it depends on the dimensions of the container and on the point in which the temperature is to be read. When taking measurements on frozen blocks it is convenient to use a mechanical tool to make a cavity in which to insert the pointed probe. It may seem easy to take a surface temperature measurement, but in actual fact is not so easy as it seems; users often complain of errors of 5-10°C. To perform a surface measurement correctly the surface must be flat and smooth and the probe must be perpendicular to the measuring plain; it may help to apply a little heat-conductive paste or a few drops of oil (water or solvents must absolutely not be used) to increase the contact surface and improve the response time.






METHOD OF USE

- * Most probes for portable instruments have an earthed cold junction; as the instrument is not provided with insulation, ensure that during measurement it does not come in contact with live surfaces with a voltage of more than 24 V. This could be dangerous for the instrument but especially for the operator who could receive an electric shock.
- * Do not use the probes in the presence of corrosive gases or liquids, or immerse them in baths of molten zama or aluminium alloys without suitable protection. Ensure that the type of material with which the probe is made (INCONEL, STAINLESS STEEL AISI 316, etc.) is compatible with the environment in which the measurement is to be taken.
- * Do not bend or deform the probes as this could cause irreparable damage.
- * Always use the most suitable probe for the measurement to be taken.
- * Be careful with the range of use of the probe, **measurements at limit values are possible only for short periods.**
- * In order to obtain a reliable measurement, avoid too fast variations in temperature.
- * Measurements on non metal surfaces require a great deal of time on account of their low heat conductivity.
- * Always clean the probe carefully after use.
- * The instrument is resistant to water but it is not watertight and should not therefore be immersed in water. If it should fall into the water, take it out immediately and check that no water has infiltrated.
- * Avoid taking measurements in the presence of high frequency sources, microwaves or large magnetic fields, as the results would not be very reliable.

LOW BATTERY WARNING AND BATTERY REPLACEMENT

If the battery voltage falls below a certain level, the  symbol appears on the display. From that moment there remains about 1 hour autonomous operation. The battery should be replaced as soon as possible, otherwise, if the voltage falls even further, the data shown are no longer correct; the battery symbol disappears. The battery used is an ordinary 9V zinc-carbon battery, IEC 6LF22.



To change the battery, unscrew the cross-headed screw on the door of the battery compartment,



open the door,



take out the old battery and put in the new one.
After replacing it, close the door, inserting the tag on the door into the slot provided, then fasten the retaining screw on the door.



Ensure that the instrument is switched off before changing the battery.

When disposing of the old battery, place it in the special refuse collection, in this way you will help protect nature.

FAULTY OPERATION WHEN SWITCHING ON AFTER CHANGING THE BATTERY

If the instrument does not switch on or off after changing the battery, repeat the battery changing procedure, waiting for a few minutes to allow the circuit condenser capacities to be completely discharged, then insert the battery.

Check that the battery you are using is really efficient; sometimes unused batteries have not been recently manufactured so, due to the auto-discharge phenomenon, their voltage level is insufficient for correct operation of the instrument.

WARNINGS

- If the instrument is not to be used for a long time the battery must be removed.
- If the battery is flat it must be replaced immediately.
- Take steps to avoid leakage of liquid from the battery.
- Use good quality leakproof batteries.

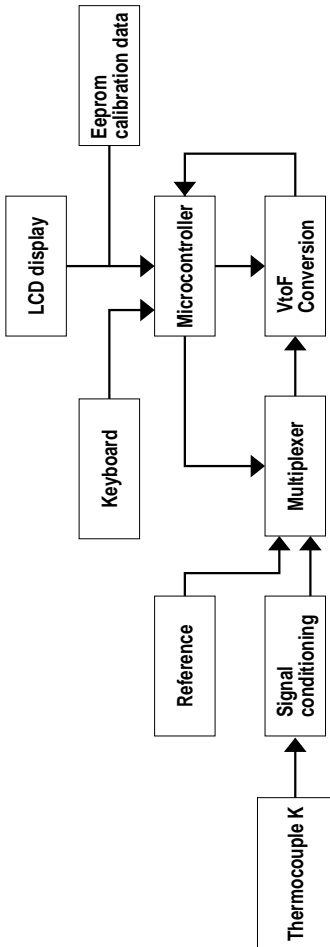
MAINTENANCE

Storage conditions:

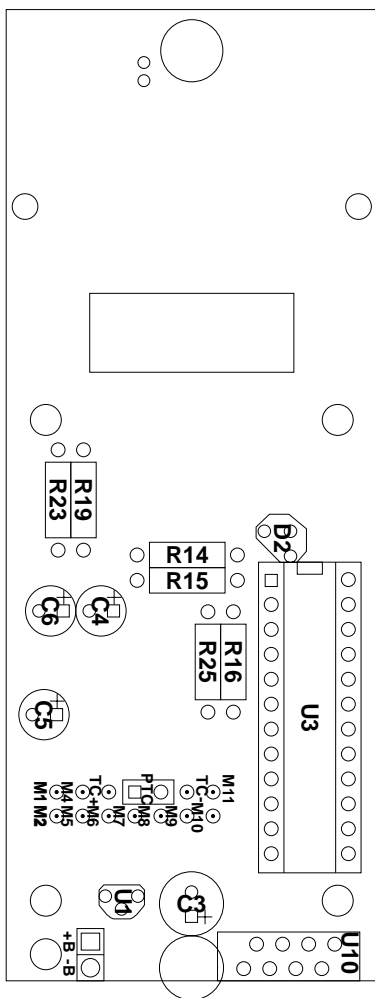
- Temperature: -20 to +60°C
- Humidity: less than 85% relative humidity.
- Do not store the instrument in places where:
 - 1) There is a high degree of humidity.
 - 2) The instrument is exposed to direct sunlight.
 - 3) The instrument is exposed to a source of high temperature.
 - 4) There are strong vibrations.
 - 5) There is steam, salt and/or corrosive gas.

The instrument body is made of plastic so it must not be cleaned with detergents which can spoil plastic.

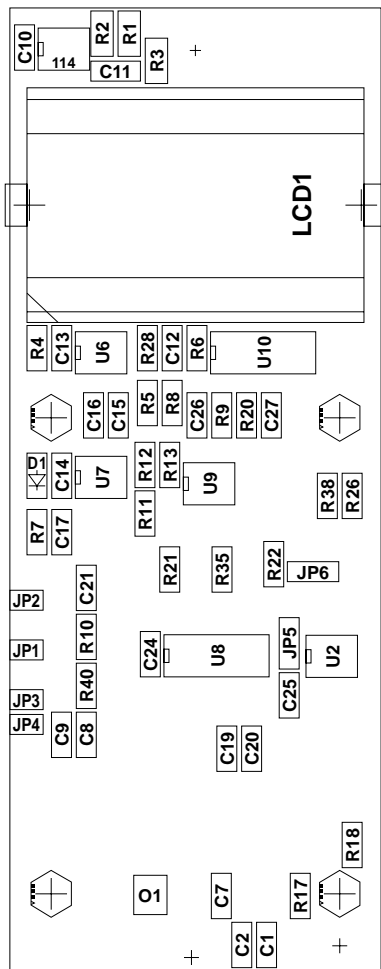
BLOCK DIAGRAM



ARRANGEMENT OF COMPONENTS



ARRANGEMENT OF COMPONENTS



CALIBRATION

The calibration data are stored in an internal memory; they may be checked, controlled or varied when required.

Attention: this operation must be carried out by skilled personnel with suitable checking and testing equipment. We strongly recommend you not to have it carried out by persons without these qualifications. The instrument has been calibrated and checked before leaving the factory.

CALIBRATION CODES

The instrument can store 5 codes.

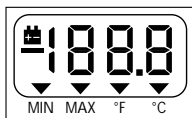
These are:

- C1** Resumes the original calibration of the instrument; this means that the instrument takes measurements and operates with the original calibration performed in the DELTA OHM workshop. It cannot be altered.
- C2** Resumes the calibration of the instrument alone; this means that the instrument takes measurements and operates with a calibration performed by the user with suitable equipment or by a SIT centre.
- C3** Resumes the calibration of the instrument plus the probe; this means that the instrument takes measurements and operates with the instrument's own calibration combined with a certain probe; in order to be correct, the measurement must always be taken with this probe.
- C6** Calibration of the instrument alone; this is the access code to enable calibration of the instrument by a SIT centre or by the user with a simulator, hence the calibration of the instrument alone.
- C8** Calibration of the instrument plus probe; this is the access code to enable calibration of the instrument plus the probe, in a furnace, by a SIT centre or by the user with suitable equipment. Calibration of the instrument with a certain probe: in order to be correct, the measurement must, of course, always be taken with this probe.

Codes **C1**, **C2**, **C3** are working codes, while **C6** and **C8** are codes used for calibration alone.

Once a code has been set, the instrument will always work with this one until it is changed.

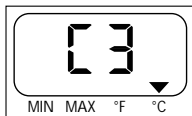
When switching on, after all the symbols have appeared on the display for a few moments, the instrument indicates the set working code.



or



or




PROCEDURE FOR CHOOSING THE WORKING CODES


To choose the working codes, proceed as follows:

1. Switch on the instrument with the **ON/OFF** key; hold down the **MAX/MIN** key and the **CAL** message appears on the display; release the **MAX/MIN** key, the **00** message appears on the display and the ▼ symbol.
2. Using the **MAX/MIN** and **°C/°F** keys, set the desired code: **01** or **02** or **03**.
3. Confirm the desired code with the **RESET** key; the **CAL** message appears.
4. The instrument switches off automatically. From this moment on the operator will take measurements with the selected working code.

PROCEDURE FOR CALIBRATING THE INSTRUMENT ALONE. (WORKING CODE C2)

1. Switch on the instrument with the **ON/OFF** key; hold down the **MAX/MIN** key and the **CAL** message appears on the display; release the **MAX/MIN** key, the **00** message appears on the display and the ▼ symbol.
 2. Using the **MAX/MIN** and **°C/°F** keys, set the code **06**, then press the **RESET** key. The "ERR" message appears, the  symbol flashes.
 3. Using a K thermocouple simulator at the instrument input, simulate zero (zero degrees Centigrade), that is the first calibration point.
 4. Using the **MAX/MIN** and **°C/°F** keys, set the correct value of zero on the display.
 5. Simulate the value of the second calibration point with the K thermocouple simulator.
 6. Using the **MAX/MIN** and **°C/°F** keys, set on the display the correct value of the second calibration point (lower than 199.9°C).
 7. Simulate the value of the third calibration point with the K thermocouple simulator.
 8. Using the **MAX/MIN** and **°C/°F** keys, set on the display the correct value of the third calibration point (around 800°C).
 9. Insert the K thermocouple probe in the connector of the instrument.
 10. Press the **RESET** key to enable calibration of the compensation of the environment temperature.
 11. Using the **MAX/MIN** and **°C/°F** keys, set the value of the environment temperature (the environment temperature must be measured with a precision thermometer).
 12. Press the **RESET** key to store the calibration performed.
 13. If the calibration procedure has been performed correctly, the **CAL** message appears and the instrument switches off automatically.
- If the calibration procedure has not been performed correctly, the **CAL** message flashes. Repeat the operation.

PROCEDURE FOR CALIBRATING THE INSTRUMENT AND ITS PROBE. (WORKING CODE C3)

1. Switch on the instrument with the **ON/OFF** key; hold down the **MAX/MIN** key and the **CAL** message appears on the display; release the **MAX/MIN** key, the **00** message appears on the display and the ▼ symbol.
2. Using the **MAX/MIN** and **°C/°F** keys, set the code **08**, then press the **RESET** key. The "ERR" message appears, the  symbol flashes.
3. The K thermocouple chosen for the combination is connected to the instrument and will be inserted in a calibrating furnace; the temperature will be 0°C, corresponding to the first calibration point.

4. Using the **MAX/MIN** and **°C/°F** keys, set on the display the temperature value corresponding to the **0°C** of the calibration furnace **minus the value of the environment temperature measured with a precision thermometer**.
 5. Insert the probe in a furnace, the temperature of which corresponds to the second calibration point.
 6. Using the **MAX/MIN** and **°C/°F** keys, set on the display the temperature value corresponding to the second calibration point of the furnace **minus the value of the environment temperature measured with a precision thermometer**.
Insert the probe in a furnace, the temperature of which corresponds to the third calibration point.
Using the **MAX/MIN** and **°C/°F** keys, set on the display the temperature value corresponding to the third calibration point of the furnace minus the value of the environment temperature measured with a precision thermometer.
 7. Bring the probe inserted in the instrument to environment temperature.
 8. Press the **RESET** key.
 9. Using the **MAX/MIN** and **°C/°F** keys, set on the display the correct value of the environment temperature (**the environment temperature must be measured with a precision thermometer**).
 10. Press the **RESET** key to store the calibration.
 11. If the calibration procedure has been performed correctly, the CAL message appears and the instrument switches off automatically.
- If the calibration procedure has not been performed correctly, the CAL message flashes. Repeat the operation.

IMPORTANT NOTE

For correct measurement or calibration, it is important for the female connection of the instrument and the male connection of the probe or simulator to be both at the same temperature, and for them to be at the same temperature as the reference cold junction.

GUARANTEE

This instrument is strictly inspected before being sold. However if there should be any defect due to manufacture and/or transport, apply to the dealer from whom you bought the instrument.

The guarantee period is 2 (two) years from the date of purchase. During this period all defects found by us will be repaired free of charge, **excluding those due to incorrect use and careless handling**.

The probes are not covered by the guarantee, as they can be irreparably damaged after only a few minutes of incorrect use.

CHARACTERISTICS

- Instrument measuring range: $-200^{\circ}\text{C} \dots +1370^{\circ}\text{C}$; ($-328^{\circ}\text{F} \dots +1999^{\circ}\text{F}$).
- Resolution: 0.1°C (0.1°F) in the range from -200°C to $+200^{\circ}\text{C}$; 1°C or 1°F beyond that.
- Automatic change of scale.
- Instrument switches off automatically after 8 minutes (the auto power off function may be disabled).
- Temperature measurement with a K thermocouple.
- High precision.
- Range of probes available for measurements by immersion, surface contact and penetration.
- Low battery charge warning light.
- Battery power supply.
- Calibration with storage of the calibration data in the memory.
Choice of instrument calibration between that of the manufacturer (not alterable) and personal calibration (alterable).
Calibration of the instrument alone.
Calibration of the instrument and its probe.

TECHNICAL DATA

- Input for type K thermocouple.
- Measuring range: $-200^{\circ}\text{C} \dots +1372^{\circ}\text{C}$; $-328^{\circ}\text{F} \dots +1999^{\circ}\text{F}$.
- Resolution: $\leq 199.9^{\circ}\text{C}$ ($^{\circ}\text{F}$) = 0.1°C (0.1°F); $\geq 200^{\circ}\text{C}$ (200°F) = 1°C (1°F).
- Precision of instrument alone:
From 0°C to 200°C = $\pm 0.5^{\circ}\text{C}$ From $+200^{\circ}\text{C}$ to full scale and from -0.1°C to -200°C = $\pm 2^{\circ}\text{C}$.
- Temperature coefficient from -5°C to 50°C : $0^{\circ}\text{C}/^{\circ}\text{C}$ from 18 and 25°C $\pm 0.01^{\circ}\text{C}/^{\circ}\text{C}$ outside this range.
- Conversion frequency: 1 second.
- **The total precision of the instrument plus the chosen measuring probe is given by the sum of the instrument error plus the error of the chosen probe.**
- Instrument working temperature: $-5^{\circ}\text{C} \dots +50^{\circ}\text{C}$.
- Storage temperature: $-20^{\circ}\text{C} \dots +60^{\circ}\text{C}$.
- Relative humidity: 0 ... 90% R.H.
- LCD display with $3\frac{1}{2}$ digits, height 8 mm, symbols MAX, MIN, $^{\circ}\text{C}$, $^{\circ}\text{F}$.
- Functions: Automatic change of scale, storage and updating of MAX, MIN, reading in $^{\circ}\text{C}$, $^{\circ}\text{F}$. Calibration by keyboard with storage of data in the memory.
- Power supply: 9V battery, IEC 6LF22, good quality zinc-carbon battery life approx. 150 hours.
- Low battery charge warning light.

- Device to enable or disable the auto-power-off function.
- Input connector for miniature standard thermocouples.
- Case: ABS Bayer NOVODUR, grey 7553CF.
- Instrument dimensions: 42 x 185 x 23 mm, weight 130 grams.
- Dimensions of instrument complete with case: 370x140x60 mm, weight 500 grams.

Thermocouple:

Temperature measuring device composed of two homogeneous but dissimilar metal conductors, insulated along their whole length. The two conductors are welded together at one end, called the measuring junction or, sometimes, hot junction, and are connected to a circuit for measuring the electromotive force (e.m.f.). The connecting area between the thermocouple and the measuring circuit is called the reference junction or, sometimes, cold junction. When there is a difference in temperature between the measuring junction and the reference junction, the thermocouple generates an e.m.f. that depends on this temperature difference (Seebeck effect).

Measuring junction (hot junction):

This is the end of the thermocouple where the two thermoelements are welded together and is the heat-sensitive part of the thermocouple.

Reference junction (cold junction):

This is the isothermal connection area between the thermocouple and the measurement circuit.

Electromotive force (e.m.f.) of the thermocouple:

This is the difference in electric potential that is measured at the open terminals of the thermocouple when there is a difference in temperature between the measurement junction and the reference junction.

The maximum recommended temperature limits for the K thermocouple and the respective dimensions of the leads are indicated for protected thermocouples, that is for thermocouples inserted in ceramic insulators, in metal or ceramic protection sheaths closed at one end. The temperature limits indicated and the respective diameters of the thermoelements are such as to allow a satisfactory life of the thermocouple in continuous duty.

Working temperature limits of the thermoelements of a type K thermocouple:

Diameter in mm.:	0,3	0,5	0,8	1,6	3,2
Maximum temperature in °C:	870	970	980	1090	1250

Tolerance:

The tolerance of a type of thermocouple corresponds to the maximum allowed deviation of the e.m.f. of any thermocouple of that type, with reference junction at 0°C. The tolerance is expressed in degrees Celsius, preceded by the plus or minus sign. The percentage tolerance is given by the ratio between the tolerance expressed in degrees Celsius and the temperature of the measuring junction, multiplied by one hundred.

Thermocouples that comply with the standard must respect one of the following two degrees of tolerance, the values of which are shown in the table.

G I (special tolerances)

G II (normal tolerances)

The tolerances refer to the working temperature for which the thermocouple is intended, with relation to the diameter of the thermoelements.

Tolerances of type K thermocouples:

	G I*	G II*
Range 0 to 1250°C:	±1,1°C or ±0,4%	±2,2°C or ±0,75%
Range -200 to 0°C:	—	±2,2°C or ±2%

* The higher limit of the two options applies. For example: for a type K thermocouple with tolerance G II, at 200°C the percentage tolerance ±0.75% is equal to ±1.5°C. The applicable limit is therefore ±2.2°C. On the other hand, at 600°C the percentage tolerance is equal to ±4.5°C, so this is the limit to be used.

The thermocouples that satisfy the limits for temperatures higher than 0°C do not necessarily satisfy the limits for the range below 0°C.

ORDER CODE:

- **HD 9218:** composed of the instrument complete with zinc/carbon battery, instructions, case.

THE PROBES MUST BE ORDERED SEPARATELY.
















The instrument may be fitted with all DELTA OHM type K thermocouple probes and with probes by other manufacturers as long as they are provided with a standard miniature connector.

The instrument and the probes may be certified by a recognized WECC centre (WESTERN EUROPEAN CALIBRATION COOPERATION), or in Italy by a SIT centre.



Western European Calibration Cooperation

COOPERATING SERVICES

	UNITED KINGDOM British Calibration Service (BCS) 1968		BELGIUM Service de la Métrologie (MS)
	IRELAND Irish Laboratory Accreditation Board (ILAB) 1985		SWITZERLAND Swiss Calibration Service (SCS) 1986
	ITALY Servizio di Taratura in Italia (SIT) 1979		FEDERAL REPUBLIC OF GERMANY Deutscher Kalibrierdienst (DKD) 1977
	NETHERLANDS Netherlands Calibration Service (NKO) 1975		DENMARK The National Testing Board of Denmark (STP) 1973
	NORWAY Norwegian Calibration Service (NKT) 1987		SPAIN Sistema de Calibración Industrial (SCI) 1983
	PORTUGAL Portuguese Institute for Quality (IPQ)		FINLAND Finnish Measurement Services Organization (MSF) 1980
	SWEDEN Swedish Metrology Organization (SMO) 1975		FRANCE Système des Chaines d'étalonnage (BNM) 1971
	AUSTRIA Österreichischer Kalibrierdienst ÖVE-ÖIAV (ÖKD) 1983		

TYPICAL EXAMPLE OF A SIT CERTIFICATE FOR THE HD 9218:

- A) Instrument alone with simulation of a thermocouple at input.
B) Instrument with the TP 743 probe.

A - Example of a calibration certificate:

SIT SERVIZIO DI TARATURA IN ITALIA
Commissione per la Metrologia - CNR
Italian Calibration Service - Metrological Commission - CNR



WECC - Western European Calibration Cooperation

CENTRO DI TARATURA 24/M/1

Calibration Centre



EMIT-LAS

istituto da
established by

E.M.I.T.
Ente Morale Istruzione Tecnica
P.le Cantore, 10 - 20123 MILANO
Tel. (02) 83.23.290 - 58.101.806
Fax (02) 83.60.393

CERTIFICATO DI TARATURA N. 6131*
Certificate of Calibration

E costituito da
number of pages n. 3 Pagine

- in data 1994.07.26
date

- destinatario DELTA OHM - Padova
addressee

- richiesta 02697/94
application

- in data 1994.07.22
date

Si riferisce a
referring to

- oggetto CALIBRATORE DIGITALE TEMPERATURA
device

- costruttore DELTA OHM - I
manufacturer

- modello HD 9218
model

- classe di precisione ----
class of accuracy

- matricola 1605943281
serial number

- data delle misure 1994.07.21
date of measurements

- registro di laboratorio 9/049
laboratory reference

Il presente Certificato di Taratura è rilasciato in base al Riconoscimento N. 24/M/1 concesso dal Servizio di Taratura in Italia e per esso dall'Istituto Metrologico Primario IMGC (*). Tale Istituto, nei campi ed entro le incertezze precisate nel Riconoscimento stesso, garantisce:

- il mantenimento della riferibilità degli apparecchi usati dal Centro, siano essi campioni materiali o strumenti campioni, ai campioni nazionali delle unità del Sistema Internazionale di unità (SI);
- la correttezza metrologica delle procedure di misura adottate dal Centro

This Certificate of Calibration is issued in accordance with approval No. 24/M/1 granted by the Primary Metrological Institute IMGC (*). This Institute, for the measurements and within the uncertainties stated in the approval, guarantees:

- the maintenance of the traceability of the apparatus used by the Centre, to national standards of the SI units, either through material standards or through calibrated instruments;
- the metrological correctness of the measurement procedures adopted by the Centre

Responsabile del Centro
Head of the Centre

(* Gli Istituti sono: } IMGC, IEN,
The Institutes are } ENEA, ISS

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N. EP-PM-01 la cui catena di riferibilità ha inizio dai campioni di prima linea N. TR11 e TC11 a loro volta muniti di certificati validi di taratura rispettivamente N. 097/94 e 65/94 IMGC

The measurement results reported in this certificate were obtained following procedures N. EP-PM-01 validated by certificates of calibration No.

Traceability is through first line standards

È ammessa la riproduzione conforme a integralità del certificato, se autorizzata dal Destinatario. Ogni riproduzione parziale o semplice citazione deve essere inoltre autorizzata dall'Istituto Metrologico Primario competente e dal Centro di Taratura.

The reproduction of this certificate in its entirety is only permitted if authorized by the addressee. Any partial reproduction or quotation of the measurement results alone must also be authorized by the relevant Primary Metrological Institute and by the Calibration Centre.

CERTIFICATO DI TARATURA N° 6131

Pagina 2

SERVIZIO DI TARATURA IN ITALIA
CENTRO DI TARATURA 24/M
EMIT-LAS

RISULTATI DELLA TARATURA

CALIBRATORE DI TEMPERATURA

Funzione : MISURA
Tipo sensore : Termocoppia tipo K
Compensazione giunto freddo : Interna

PUNTO N°	F.E.M. APPLICATA (mV)	TEMPERATURA CORRISPONDENTE (°C)	TEMPERATURA MISURATA (°C)	DIFFERENZA (°C)
1	0.000	0.0	-0.2	-0.2
2	4.095	100.0	100.0	0.0
3	8.137	200.0	200	0
4	12.207	300.0	300	0
5	16.395	400.0	401	1
6	20.640	500.0	502	2
7	24.902	600.0	601	1
8	29.128	700.0	702	2
9	33.277	800.0	802	2
10	37.325	900.0	902	2
11	41.269	1000.0	1003	3
12	45.108	1100.0	1103	3
13				
14				
15				

I valori della f.e.m. applicata riportati nella tabella, sono ricavati dalla Norma IEC 584; le temperature sono espresse in gradi Celsius secondo la IPTS 68

B - Example of a calibration certificate:

SIT SERVIZIO DI TARATURA IN ITALIA
Commissione per la Metrologia - CNR

Italian Calibration Service - Metrological Commission - CNR



WECC - Western European Calibration Cooperation

CENTRO DI TARATURA 24/M/1

Calibration Centre



EMIT-IAS

istituto da
established by



E.M.I.T.
Ente Morale Istruzione Tecnica
P.le Cantore, 10 - 20123 MILANO
Tel. (02) 83.23.290 - 58.101.806
Fax (02) 83.60.393

CERTIFICATO DI TARATURA N. 6216.

Certificate of Calibration

<u>È costituito da</u> number of pages	n. 3 Pagine
- in data date	1994.08.30
- destinatario addressee	DELTA OHM - Padova
- richiesta application	02697/94
- in data date	1994.07.22
<u>Si riferisce a</u> referring to	
- oggetto device	INDICATORE DIGITALE
- costruttore manufacturer	DELTA OHM - I
- modello model	HD 9218 Sonda : 1TCK TP743
- classe di precisione class of accuracy	---
- matricola serial number	1605943281 & 94134
- data delle misure date of measurements	1994.07.27-28
- registro di laboratorio laboratory reference	9/050

Il presente Certificato di Taratura è rilasciato in base al Riconoscimento N. 24/M/1 concesso dal Servizio di Taratura in Italia e per esso dall'Istituto Metrologico Primario IMGC (*). Tale Istituto, nei campi ed entro le incertezze precisate nel Riconoscimento stesso, garantisce:

- il mantenimento della riferibilità degli apparecchi usati dal Centro, siano essi campioni materiali o strumenti campioni, ai campioni nazionali delle unità del Sistema Internazionale di unità (SI);
- la correttezza metrologica delle procedure di misura adottate dal Centro.

This Certificate of Calibration is issued in accordance with approval No. 24/M/1 granted by the Primary Metrological Institute IMGC (*). This Institute, for the measurements and within the uncertainties stated in the approval, guarantees:

- the maintenance of the traceability of the apparatus used by the Centre, to national standards of the SI units, either through material standards or through calibrated instruments;
- the metrological correctness of the measurement procedures adopted by the Centre.

Responsabile del Centro
Head of the Centre

(* Gli Istituti sono: } IMGC, IEN.
The Institutes are } ENEA, ISS.

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure N. EP-PM-01 la cui catena di riferibilità ha inizio dai campioni di prima linea N. TR11 e TC11 a loro volta muniti di certificati validi di taratura rispettivamente N. 097/94 e 65/94 IMGC

The measurement results reported in this certificate were obtained following procedures No. EP-PM-01 validated by certificates of calibration No.

Traceability is through first line standards

È ammessa la riproduzione conforme e integrale del certificato, se autorizzata dal Destinatario. Ogni riproduzione parziale o semplice citazione deve essere inoltre autorizzata dall'Istituto Metrologico Primario competente e dal Centro di Taratura.

The reproduction of this certificate in its entirety is only permitted if authorized by the addressee. Any partial reproduction or quotation of the measurement results alone must also be authorized by the relevant Primary Metrological Institute and by the Calibration Centre.

CERTIFICATO DI TARATURA N. 6216

Pagina 2

SERVIZIO DI TARATURA IN ITALIA
CENTRO DI TARATURA 24/M/1
EMIT-LAS

RISULTATI DELLA TARATURA

Sensore : 1 TCK TP743 S.N. 94134
Indicatore : DELTA OHM mod.HD9218 S.N. 1605943281

PUNTO N.	TEMPERATURA MISURATA (°C)	TEMPERATURA INDICATA (°C)	DIFFERENZA TEMP. IND. - MIS. (°C)
1	0.00	-0.1	-0.10
2	50.44	50.3	-0.14
3	100.32	100.4	0.08
4	150.61	150.8	0.19
5	200.09	200	-0.09
6	-----	-----	-----
7			
8			
9			
10			

GUARANTEE CONDITIONS

All our appliances have been subjected to strict tests and are guaranteed for 24 months from date of purchase. The Company undertakes to repair or replace free of charge any parts which it considers to be inefficient within the guarantee period. Complete replacement of the instrument is excluded and no requests for damages are recognized, whatever their origin. Repairs are carried out in our own Technical Service Department. Transport expenses are borne by the buyer. **The guarantee does not include: accidental breakages due to transport, incorrect use or neglect, incorrect connection to voltage different from that contemplated for the instrument, probes, sensors, electrodes and all accessories.** Furthermore the guarantee is not valid if the instrument has been repaired or tampered with by unauthorized third parties, or adjusted for faults or casual checking. The guarantee is valid only if all parts of the guarantee card have been filled in. Any instruments sent for repairs must be accompanied by their guarantee certificate. For all disputes the competent court is the Court of Padua.

CE CONFORMITY	
Safety	EN61000-4-2, EN61010-1 level 3
Electrostatic discharge	EN61000-4-2 level 3
Electric fast transients	EN61000-4-4 level 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B

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