Starting from the detected values, HD32.2 can calculate:
- **WBGT(in)** index (Wet Bulb Glob Temperature: wet bulb temperature and Globe thermometer) in absence of solar radiation.
- **WBGT(out)** index (Wet Bulb Glob Temperature wet bulb temperature and Globe thermometer) in presence of solar radiation.

WBGT index
WBGT (Wet Bulb Globe Temperature – Wet bulb temperature and globe thermometer) is one of the indexes used to determinate the occupational heat exposure.
It represents the value, related to the metabolic expenditure linked to a specific work activity, that causes a thermal stress when exceeded.
WBGT index combines the temperature measurement of wet bulb with natural ventilation t_{nw} with the globe thermometer t_g and, in some situations, with the air temperature t_a.
The calculation formula is the following:
- inside and outside a buildings in absence of solar radiation:

$$WBGT_{close\ environments} = 0,7\ t_{nw} + 0,3\ t_g$$

- outside a building in presence of solar radiation:

$$WBGT_{outside\ environments} = 0,7\ t_{nw} + 0,2\ t_g + 0,1\ t_a$$

where:
t_{nw} = natural wet bulb;
t_g = globe thermometer temperature;
t_a = air temperature.
The measured data should be compared with the limit values prescribed by the regulations;
when exceeded you have to:
- reduce directly the thermal stress on the examined work place;
- proceed to a detailed analysis of the thermal stress.

In order to measure the WBGT index, the following probes should be connected:
- **Natural wet bulb HP3201.2 (HP3201).**
- **TP3276.2 Globe thermometer probe (TP3276 or TP3275).**
- **TP3207.2 (TP3207) Dry bulb temperature, if the measurement is performed in presence of solar radiation.**

In order to measure the WBGT index, you should refer to the following regulations:
- **ISO 7726**
- **ISO 7243**
- **ISO 8996**

Technical features
Instrument

Dimensions (Length x Width x Height)	185x90x40 mm
Weight	470 g (batteries included)
Materials	ABS, rubber
Display	back light, with dot-matrix 160x160 points, visible area 52x42mm

HD 32.2, HD32.2A
INSTRUMENT FOR THE ANALYSIS OF THE WBGT INDEX

HD32.2 – WBGT Index is an instrument made by Delta Ohm srl for the analysis of WBGT index (Wet Bulb Glob Temperature: wet bulb temperature and globe thermometer temperature) in presence or in absence of solar radiation.
Reference Regulations:
ISO 7243: Hot environments. Estimation of the heat stress on working man, based on WBGT index (wet bulb temperature and Globe thermometer).
ISO 8996: Ergonomics of the thermal environment – Determination of the energy metabolism.
ISO 7726: Ergonomics of the thermal environment – Instruments for measuring physical quantities.

The instrument is provided with three inputs for probes with SICRAM module: the SICRAM module interface between the instrument and sensor connected and communicate the sensor parameters and calibration data to the instrument.

All SICRAM probes can be connected to any of the instrument's inputs, they are automatically recognized upon turning the Instrument on.

The **main features** of the instrument are:
- **Logging:** data acquisition and logging to the internal instrument memory. Storage capacity: **64 different logging sections,** sample interval, user selectable.
- You can set the automatic logging start with **auto-start** function **(Start/Stop time)**.
- The **measurement unit** of the temperature: °C, °F, °K.
- The display of **maximum, minimum, medium** statistic parameters.
- The data transfer via the RS232 or USB serial ports.

HD32.2 instrument can detect simultaneously the following quantities:
- Globe thermometer temperature **Tg**.
- Wet bulb temperature with natural ventilation **Tn.**
- Environment temperature **T**.

HD2110USB

HD2110/RS

SWD10

VTRAP30

Working conditions

Working temperature	-5 … 50°C
Storage temperature	-25 … 65°C
Working relative humidity	0 … 90% RH no condensation

Protection Degree   **IP65**

Instrument uncertainty   ± 1 digit @ 20°C

Power supply

	Mains power supply (code SWD10) 12Vdc/1A
Batteries	4 batteries 1.5V type AA
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	< 45µA

Safety of the stored data   unlimited

TP3207.2 (TP3207) Temperature probe

Sensor type:	Pt100 with thin-film
Accuracy:	Class 1/3 DIN
Measurement range:	-40 ÷ 100 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM module
Connector:	8 female poles DIN45326
Dimensions:	Ø=14 mm L= 150 mm
Response time T_{95}:	15 minutes

External power supply

TP3276.2

HP3201.2

TP3207.2

RS232
USB

HD32.2

HD40.1

*Example of immediate data print, obtained with **HD40.1** printer.*

```
=========================
  ISO 7243 WBGT Index
=========================
Model HD32.2 WBGT Index
Firm.Ver.=01.00
Firm.Date=2008/12/05
SN=12345678
ID=0000000000000000
-------------------
Probe ch.1 description
Type: Pt100
Data cal.:2008/10/01
Serial N.:08109450
-------------------
Probe ch.2 description
Type: Pt100 Tg 50
Data cal.:2008/10/01
Serial N.:08109452
-------------------
Probe ch.3 description
Type: Pt100 Tw
Data cal.:2008/10/01
Serial N.:08109454
=========================
Date=2008/11/21 15:00:00
Tnw          21.2 °C
Tg           24.9 °C
Ta           31.3 °C
WBGT (i)     22.3 °C
WBGT (o)     23.0 °C
=========================
Notes:
=========================
```

NOTES

Reference standard

Instrument Model
Instrument firmware version
Instrument firmware date
Instrument Serial Number
Identification Code

Description of the probe connected to input 1

Description of the probe connected to input 2

Description of the probe connected to input 3

Date and time
Natural wet bulb
Globe thermometer ventilation
Dry bulb temperature
WBGT in absence of direct solar radiation
WBGT in presence of direct solar radiation
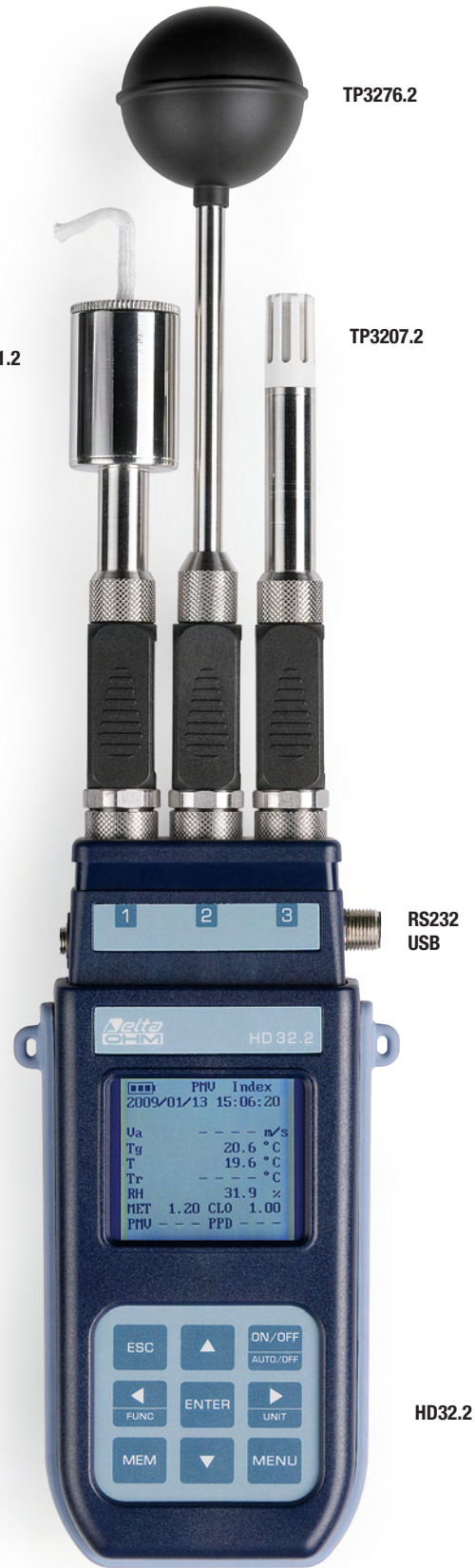
TP3276.2 Globe thermometer probe Ø=50 mm (Ø=150mm TP3275)

Sensor type:	Pt100
Accuracy:	Class 1/3 DIN
Measurement range:	-10 ÷ 100 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM module
Connector:	8 female poles DIN45326
Stem dimensions:	Ø=8 mm L= 170 mm
Response time T_{95}:	15 minutes

HP3201.2 (HP3201) Natural ventilation wet bulb

Sensor type:	Pt100
Accuracy:	Class A
Measurement range:	4 °C ÷ 80 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM module
Connector:	8 female poles DIN45326
Stem dimensions:	Ø=14 mm L= 170 mm
Braid length:	10 cm. at least
Tank capacity:	15 cc.
Tank autonomy:	96 hours with RH=50%, t = 23°C
Response time T_{95}:	15 minutes

Connections	Input for probes with SICRAM module 3 Connectors 8 male poles DIN 45326

USB Interface

Type	USB 1.1 or 2.0 insulated
Connection	M12-8 poles
Baud rate	460800 baud

RS232 Serial Interface:

Pin:	M12-8 poles.
Type:	RS232C (EIA/TIA574) insulated
Baud rate:	from 1200 to 38400 baud.
Data bit:	8
Parity:	None
Stop bit:	1
Flow control:	Xon-Xoff
Cable length:	max 15m

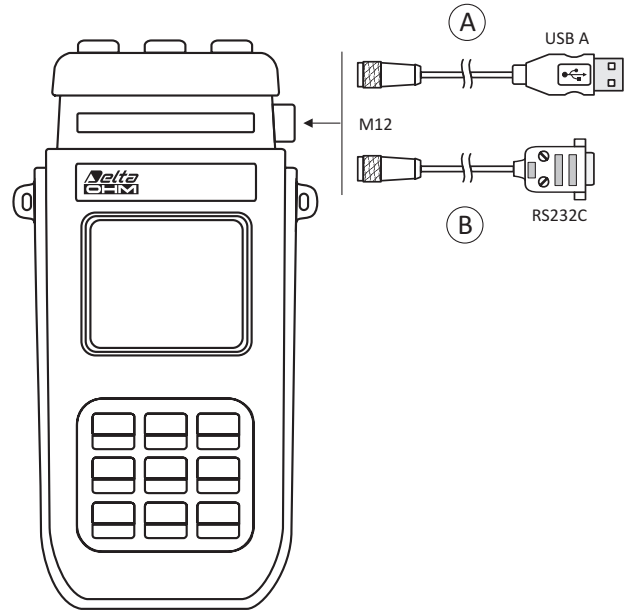|	
Memory	divided in 64 blocks.
Storage capacity	67600 memorizations for each of the 3 inputs.
Logging interval	selectable among: 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes and 1 hour.

Logging interval	Storage capacity
15 seconds	Approx. 11 days and 17 hours
30 seconds	Approx. 23 days and 11 hours
1 minute	Approx. 46 days and 22 hours
2 minutes	Approx. 93 days and 21 hours
5 minutes	Approx. 234 days and 17 hours
10 minutes	Approx. 1 year and 104 days
15 minutes	Approx. 1 year and 339 days
20 minutes	Approx. 2 years and 208 days
30 minutes	Approx. 3 years and 313 days
1 hour	Approx. 7 years and 261 days

A USB connection to PC using type A USB - M12 cable, code HD2110USB. **USB drivers are required**.

B RS232C connection to PC. It allows you to connect the RS232C serial port of a PC or the printer HD40.1 with the cable HD2110RS.

ORDERING CODES

HD32.2 consisting of:
 • **HD32.2 WBGT Index instrument**, 4 alkaline batteries 1.5V AA type, instruction manual, case. **DeltaLog10 Software Warm environments: WBGT analysis. Probes and cables have to be ordered separately.**

Required probes for the measurement of **WBGT**:
 • **TP3207.2** Probe of dry bulb temperature.
 • **TP3276.2** Globe thermometer probe.
 • **HP3201.2** Natural ventilation wet bulb

HD32.2A consisting of:
 • **HD32.2 WBGT Index instrument**, 4 alkaline batteries 1.5V AA type, instruction manual, case. **DeltaLog10 Software Warm environments: WBGT analysis. Probes and cables have to be ordered separately.**

Required probes for the measurement of **WBGT version A**:
 • **TP3207** Dry bulb temperature.
 • **TP3275** Globe thermometer probe.
 • **HP3201** Natural ventilation wet bulb.

AP3203.2   HP3217.2   TP3276.2

HP3201.2   TP3276.2   TP3207.2

Probes for HD32.2 WBGT Index (without cable):

**TP3207.2:** Temperature probe with Pt100 sensor. Probe stem Ø 14mm, length 150 mm. Equipped with SICRAM module.

TP3276.2: Globe thermometer probe with Pt100 sensor, globe Ø 50 mm. Stem Ø 8 mm, length 170 mm. Equipped with SICRAM module.

HP3201.2: Natural wet bulb. Pt100 sensor. Probe stem Ø 14 mm, length 170 mm. Equipped with SICRAM module, spare parts of the braid and case of 50cc. distilled water.

Probes for HD32.2 version A (with cable):

TP3207: Temperature probe with Pt100 sensor. Probe stem Ø 14mm, length 140 mm. Cable length 2m. Equipped with SICRAM module. Used for the calculation of the indices: **IREQ,WCI, DLE, RT, PMV, PPD, WBGT, SR**. Used for calculating Mean radiant temperature.

TP3275: Globe thermometer probe with Pt100 sensor, globe Ø 150 mm. Stem Ø 14 mm, length 110 mm. Cable length 2m. Equipped with SICRAM module. Used for calculating Mean radiant temperature and WBGT.

HP3201: Natural ventilation wet bulb. Pt100 sensor. Probe stem Ø 14 mm, length 110 mm. Cable length 2m. Equipped with SICRAM module, spare braids and 50cc of distilled water. Used for the measurement for **WBGT** calculation.

Accessories:

VTRAP30: Tripod to suit instrument with a maximum height of 280 mm

HD32.2.7: Probe holder, **to be fixed on standard tripod. For version HD32.2A.**

HD2110RS: Connection cable with M12 connector from the instrument side and with SubD female connector 9 poles for RS232C from PC side.

HD2110USB: Connection cable with M12 that attaches to instrument side and USB 2.0 on PC side.

SWD10: 100-240Vac/12Vdc-1A mains voltage stabilized power supply.

AQC: 200cc. of distilled water and n° 3 braids for HP3201 or HP3201.2 probes

HD40.1: 24-column portable printer (uses cable HD2110RS).

BAT.40: Spare battery pack for HD40.1 printer with built-in temperature sensor.

RCT: The kit includes 4 thermal paper rolls, wide 57mm, diameter 32mm.

TP3275

HP3201   TP3207

HD32.2A

HD32.2.7

HD32.3
HD32.3A
WBGT-PMV-PPD
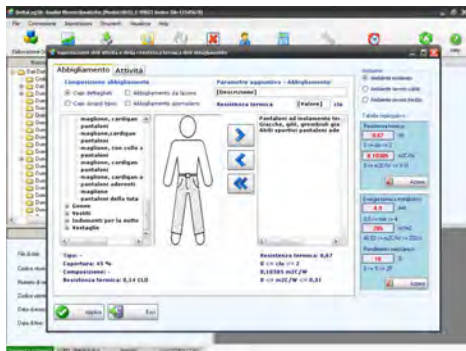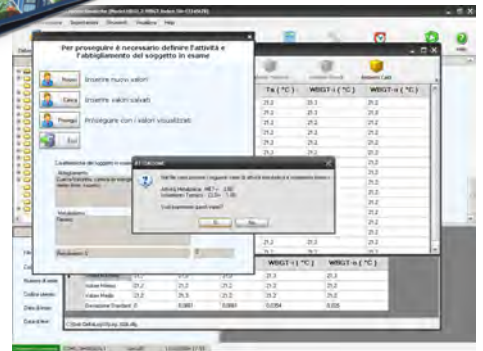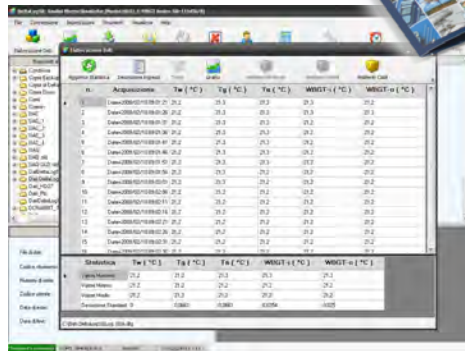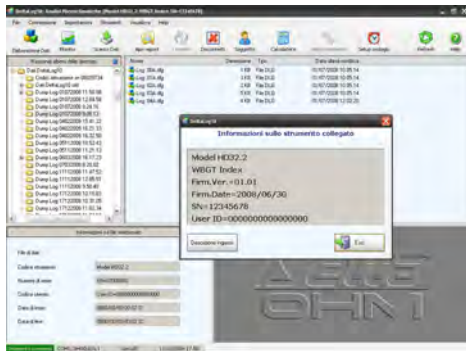
HD 32.3, HD32.3A
INSTRUMENT FOR THE ANALYSIS OF THE INDICES:
WBGT - PMV - PPD

HD32.3 – WBGT - PMV Index is an instrument made by **Delta Ohm Srl** for:
- Analysis of hot environments using **WBGT** index (Wet Bulb Glob Temperature: wet bulb temperature and Globe thermometer) in presence or absence of solar radiation.
- Analysis of the moderate warm environments using **PMV** index (Predicted Mean Vote) and **PPD** index (Predicted Percentage of Dissatisfied).

Reference standards:

ISO 7243: Hot environments. Estimation of the heat stress on working man, based on WBGT index (wet bulb globe Thermometer).

ISO 8996: Ergonomics of the thermal environment. Determination of metabolic rate.

ISO 7726: Ergonomics of the thermal environment – Instruments for measuring physical quantities.

ISO 7730: Moderate thermal environments. Determination of PMV and PPD index and specification of the condition for thermal comfort.

The instrument is provided with three inputs for probes with SICRAM module: the SICRAM module is an interface between the instrument and connected sensor and communicates the sensor parameters and calibration data to the instrument.

All SICRAM probes can be plugged into any of the inputs: they are automatically recognized upon turning on the instrument.

The **main features** of the instrument are:
- **Logging:** data acquisition and logging in the internal instrument memory. Storage capacity: **64 different logging sections, sample interval, user selectable.**
- Start and stop can be set automatically with the **auto-start function**,
- Selectable **measurement unit** of the temperature: °C, °F, °K.
- The display of **maximum, minimum, medium** statistic parameters.
- The data transfer via RS232 or USB serial port.

HD32.3 instrument can detect simultaneously the following quantities:
- Globe thermometer temperature **Tg** with **TP3276.2 (or TP3275)** probe.
- Natural wet bulb temperature **Tn** with **HP3201.2 (or HP3201)** probe.
- Environment temperature **T** with **TP3207.2** probe **(or TP3207).**
- Relative humidity **RH** and environment temperature **T** with **HP3217.2 (or HP3217R)** probe.
- Air speed **Va** with **AP3203.2 (or AP3203)** probe.

Starting from the measured values, HD32.3 can **calculate** and **display,** with **TP3207.2 (or TP3207), TP3276.2 (or TP3275),** and **HP3201.2 (or HP3201)** probes, the following indexes:
- **WBGT (in)** Index (Wet Bulb Glob Temperature: wet bulb temperature and globe thermometer) in absence of solar radiation.
- **WBGT (out)** Index (Wet Bulb Glob Temperature: wet bulb temperature and globe thermometer) in presence of solar radiation.

Starting from the measured values, the HD32.3 instrument can **calculate** and **display,** with **HP3217.2R (or HP3217R), TP3276.2 (or TP3276 or TP3275),** and **AP3203.2 (or AP3203)** probes, the following indexes:
- Medium radiant temperature **Tr**.
- **PMV** Index (Predicted Mean Vote).
- **PPD** Index (Predicted Percentage of Dissatisfied).

WBGT index

WBGT (Wet Bulb Globe Temperature – wet bulb and globe temperature) is one of the indexes used to determinate the occupational heat exposure.

It represents the value, related to the metabolic expenditure linked to a specific work activity, that causes a thermal stress when exceeded.

WBGT index combines the measurement of wet bulb temperature t_{nw} with natural ventilation with the globe thermometer temperature t_g and, in some situations, with the air temperature t_a.

The calculation formula is the following:
- inside and outside the buildings in absence of solar radiation:

$$WBGT_{close\ environments} = 0,7\ t_{nw} + 0,3\ t_g$$

- outside the buildings in presence of solar radiation:

$$WBGT_{outside\ environments} = 0,7\ t_{nw} + 0,2\ t_g + 0,1\ t_a$$

where:

t_{nw} = wet bulb temperature with natural ventilation;

t_g = globe thermometer temperature;

t_a = air temperature.

The measured data should be compared with the limit values prescribed by the regulations;

when exceeded you have to:
- reduce directly the thermal stress on the examined work place;
- proceed to a detailed analysis of the thermal stress.

In order to measure the WBGT index, the following probes should be connected:
- **Natural wet bulb HP3201.2 (or HP3201).**
- **TP3276.2 (or TP3275 or TP3276) Globe thermometer probe.**
- **TP3207.2 (or TP3207) Dry bulb temperature, of the measurement is performed in presence of solar radiation.**

In order to measure the WBGT index, you should refer to the following regulations:
- **ISO 7726**
- **ISO 7243**
- **ISO 8996**

PMV - PPD indexes

Human thermal comfort is defined by ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers INC) as the state of mind that expresses satisfaction with the surrounding living or working environment.

The evaluation of this subjective condition can be objectified and quantified using integrated index that consider the micro climatic environment parameters (Ta, Tr, Va, RH), and the work-related energy metabolic expenditure MET, and the typology of clothing (thermal insulation CLO) commonly used.

Among these indexes, the most precise one reflecting the influence of the above mentioned physical and physiological variables on thermal comfort is **PMV** (Predicted Mean Vote).

Synthetically, it comes from the equation of the thermal balance whose result is compared to a scale of psycho - physical health and expresses the average opinion (average foreseen vote) about the thermal sensations of a group of subjects.

From PMV is derived a second index called **PPD** (Predicted Percentage of Dissatisfied) that quantifies the percentage of subjects who will be dissatisfied with some micro climatic conditions.

ISO 7730 regulations suggests PMV use in presence of following variables that influence the thermal balance:
- Metabolic expenditure = 1 ÷ 4 met
- Thermal resistance of clothing = 0 ÷ 2 clo
- Dry bulb temperature = 10 ÷ 30°C
- Medium radiant temperature = 10 ÷ 40°C

- Air speed = 0 ÷ 1 m/sec
- Water vapour pressure = 0 ÷ 2,7 kPa

PMV is a particularly suitable index for the evaluation of **work places with moderate microclimate** such as houses, schools, offices, research laboratories, hospitals, and is useful to predict the number of people likely to feel uncomfortably warm or cool.

According to ISO 7730 PMV values range between + 0,5 and - 0,5, provides comfort conditions corresponding to a percentage of dissatisfied (PPD) lower than 10%. (see table below).

Table 1: valuation scale of the thermal environment

PMV	PPD %	EVALUATION THERMAL ENVIRONMENT
+3	100	Hot
+2	75,7	Warm
+1	26,4	Slightly warm
+0,85	**20**	**Acceptable thermal condition**
-0,5 < PMV < +0,5	**< 10**	**Comfortable**
-0,85	**20**	**Acceptable thermal condition**
-1	26,8	Cool
-2	76,4	Cold
-3	100	Extremely cold

To calculate PMV and PPD indices, it's necessary to know:
- the working load (energy expenditure);
- the clothing thermal insulation.

AP3203.2

TP3276.2

HP3217.2R

RS232
USB

HD32.3

HD40.1

Microclimate - WBGT

Example of immediate data printing of PMV, obtained with HD40.1 printer

```
=========================
   ISO 7730  PMV Index
=========================
Model HD32.3 WBGT - PMV
Firm.Ver.=01.00
Firm.Date=2008/12/05
SN=12345678
ID=0000000000000000
----------------------
Probe ch.1 description
Type: Hot wire
Data cal.:2008/10/15
Serial N.:08109460
----------------------
Probe ch.2 description
Type: Pt100 Tg 50
Data cal.:2008/10/01
Serial N.:08109452
----------------------
Probe ch.3 description
Type: RH
Data cal.:2008/10/15
Serial N.:08109464
=========================
Date=2008/11/21 15:00:00
Va          0.00 m/s
Tg          22.0 °C
Ta          22.0 °C
RH          39.1  %
MET         1.20
CLO         1.00
PMV         0.10
PPD         5.10  %
=========================
```

NOTES

Reference standard

Instrument model
Version of the instrument firmware
Date of the instrument firmware
Serial number of the instrument
Identification Code

Description of the probe connected to input 1

Description of the probe connected to input 2

Description of the probe connected to input 3

Date and time
Air speed
Globe thermometer temperature
Dry bulb temperature
Relative humidity
Metabolic expenditure
Resistance of clothing
PMV – Predicted Mean Vote
PPD – Predicted Percentage of Dissatisfied

Average radiant temperature T_r

The average radiant temperature is defined as the temperature of thermally uniform simulated environment that would exchange with a man the same thermal radiation power exchanged in the real environment.

In order to evaluate the average radiant temperature, it is necessary to measure: the globe thermometer temperature, the air temperature, and the air speed measured close to the globe thermometer.

TECHNICAL FEATURES
Instrument
Dimensions	
(Length x Width x Height)	185x90x40 mm
Weight	470 g (batteries included)
Materials	ABS, rubber
Display	Back light, dot-matrix
	160x160 points, visible area 52x42mm

Working Conditions
Working temperature	-5 … 50°C
Storage temperature	-25 … 65°C
Working relative humidity	0 … 90% RH no condensation
Protection Degree	**IP65**

Instrument uncertainty	± 1 digit @ 20°C

Power supply	Mains power supply (cod. SWD10) 12Vdc/1A
Batteries	4 batteries 1.5V type AA
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	< 45µA

Safety of the stored data	Unlimited

TP3207.2 (TP3207) temperature probe
Sensor type:	Pt100 with thin film
Accuracy:	Class 1/3 DIN
Measurement range:	-40 ÷ 100 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM module
Connector:	8 female poles DIN45326
Dimensions:	Ø=14 mm L= 150 mm
Response time T_{95}:	15 minutes

TP3276.2 globe thermometer probe Ø=50 mm (Ø=150 mm TP3275)
|	
Sensor type:	Pt100
Accuracy:	Class 1/3 DIN
Measurement range:	-10 ÷ 100 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM module
Connector:	8 female poles DIN45326
Stem dimension:	Ø=8 mm L= 170 mm
Response time T_{95}:	15 minutes

HP3201.2 (HP3201) Natural wet bulb
Sensor type:	Pt100
Accuracy:	Class A with platinum wire
Measurement range:	4 °C ÷ 80 °C
Resolution:	0.1°C
Temperature drift @20°C:	0.003%/°C
Drift after 1 year:	0.1°C/year
Connection:	4 wires plus SICRAM Module
Connector:	8 female poles DIN45326
Stem dimension:	Ø=14 mm L= 170 mm
Braid length:	10 cm. at least
Tank capacity:	15 cc.
Tank autonomy:	96 hours with RH=50%, t = 23°C
Response time T_{95}:	15 minutes

HD32.2.7

HP3217.2R (HP3217R) Combined temperature and relative humidity probe
Sensor type:	Pt100 with thin film for temperature
	Capacitive sensor for relative humidity
Temperature accuracy:	1/3 DIN
Relative humidity accuracy:	± 1.5%RH (0 ÷ 90 %RH)
	± 2.0%RH remaining range, for T=15…35°C
	± (1.5+1.5% of measure)%RH in the remaining temperature range
Measuring range:	temperature: -40…+100°C
	relative humidity: 0…100%RH
Connection:	4 wires plus SICRAM Module
Connector:	8 female poles DIN45326
Dimensions:	Ø=14 mm L= 150 mm
Response time T_{95}:	15 minutes
Resolution:	0.1%RH, 0.1°C

AP3203.2 (AP3203) Omnidirectional hot wire probe
Sensor type:	NTC 10kohm
Accuracy:	± 0.2 m/s (0÷1 m/s)
	± 0.3 m/s (1÷5 m/s)
Measuring range:	0.1…5 m/s
	0 °C ÷ 80 °C
Connection:	7 wires plus SICRAM Module
Connector:	8 female poles DIN45326
Stem dimension:	Ø=8 mm L= 230 mm

TP3275

AP3203

HP3217R

HP32.2.7

HD32.3A
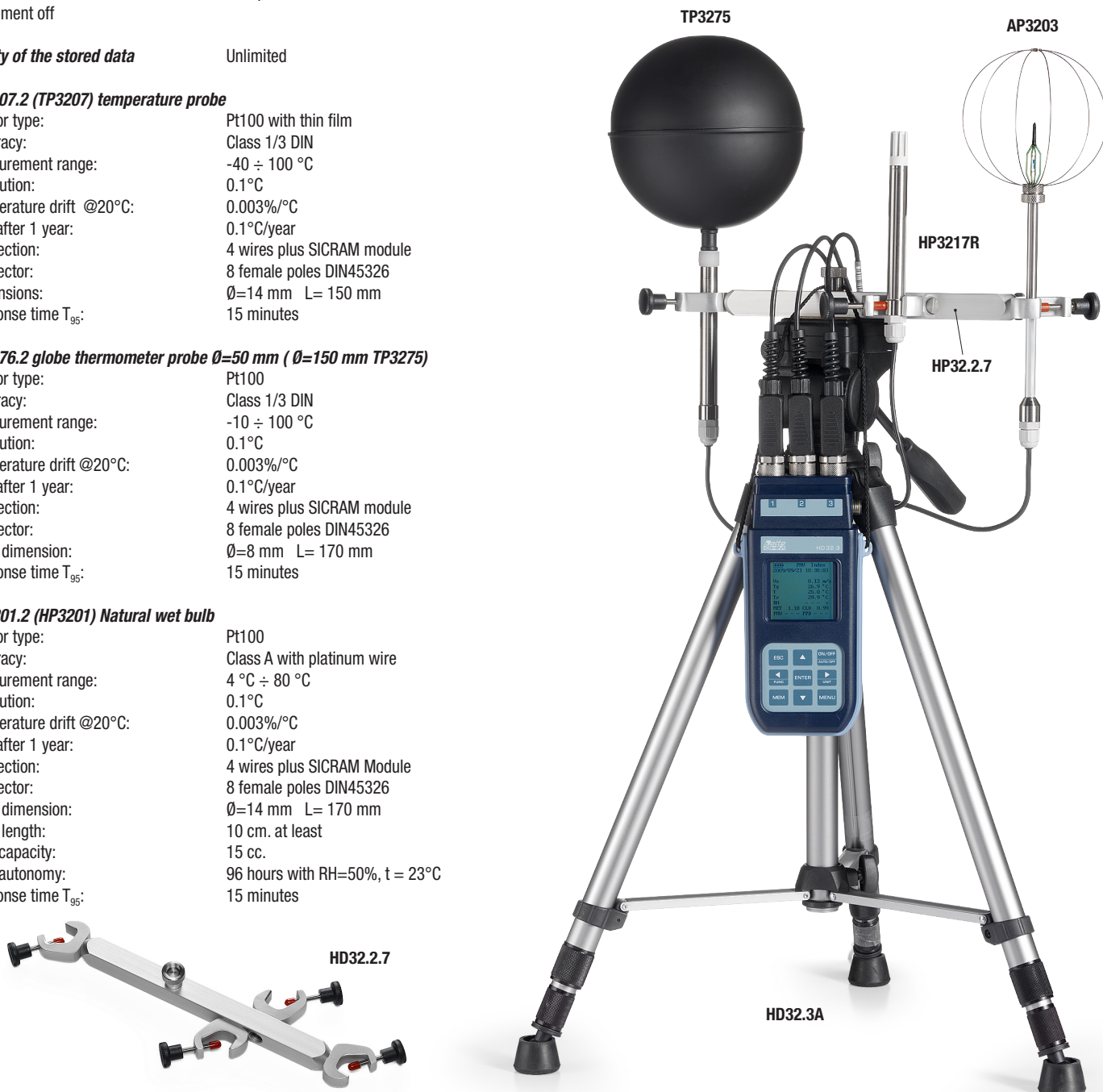
Protection dimension:	Ø=80 mm
Resolution:	0.01 m/s
Temperature drift @20°C:	0.06% /°C
Drift after 1 year:	0.12 °C/years

Connections

Input for SICRAM module probes	3 Connectors 8 male poles DIN 45326

USB Interface

Type	USB 1.1 or 2.0 insulated
Connection	M12-8 poles
Baud rate	460800 baud.

RS232C Serial interface:

Pin:	M12-8 poles.
Type:	RS232C (EIA/TIA574) insulated
Baud rate:	from 1200 to 38400 baud.
Data bit:	8
Parity:	None
Stop Bit:	1
Flow Control:	Xon-Xoff
Cable length:	max 15m

Memory divided in 64 blocks.

Storage capacity	67600 memorizations for each of 3 inputs.
Logging interval	selectable among: 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes and 1 hour.

Logging interval	Storage capacity
15 seconds	Approx. 11 days and 17 hours
30 seconds	Approx. 23 days and 11 hours
1 minute	Approx. 46 days and 22 hours
2 minutes	Approx. 93 days and 21 hours
5 minutes	Approx. 234 days and 17 hours
10 minutes	Approx. 1 year and 104 days
15 minutes	Approx. 1 year and 339 days
20 minutes	Approx. 2 years and 208 days
30 minutes	Approx. 3 years and 313 days
1 hour	Approx. 7 years and 261 days

A USB connection to PC using type A USB - M12 cable, code HD2110USB. **USB drivers are required.**

B RS232C connection to PC. It allows you to connect the RS232C serial port of a PC or the printer HD40.1 with the cable HD2110RS.

ORDERING CODES

HD32.3 is composed of:
- Instrument **HD32.3**, 4 alkaline batteries 1.5V type AA, instruction manual, case. **DeltaLog10 Software for the analysis of WBGT, PMV and PPD indexes. Probes and cables have to be ordered separately.**

HD32.3A is composed of:
- Instrument **HD32.3**, 4 alkaline batteries 1.5V type AA, instruction manual, case. **DeltaLog10 Software for the analysis of WBGT, PMV and PPD indexes. Probes and cables have to be ordered separately.**

The **probes** required for **WBGT** measurement are:
- TP3207.2 (TP3207) Dry bulb temperature probe.
- TP3276.2 (TP3275 or TP3276) Globe thermometer probe.
- HP3201.2 (HP3201) Natural wet bulb temperature probe with natural ventilation.

The **probes** required for **PMV** measurement are:
- HP3217.2R (HP3217R) Combined e temperature and relative humidity probe
- AP3203.2 (AP3203) Omni-directional hot wire probe.
- TP3276.2 (TP3275 or TP3276) Globe thermometer probe.

Probes for HD32.3 (without cable)

TP3207.2: Temperature probe with Pt100 sensor. Probe stem Ø 14mm, length 150mm. Equipped with SICRAM module. **Used for WBGT measurement.**

TP3276.2: Globe thermometer sensor Pt100, globe Ø 50 mm. Stem Ø 8 mm, length 170 mm. Equipped with SICRAM module. **Used for WBGT, PMV and PPD measurements.**

HP3201.2: Natural wet bulb. Pt100 sensor. Probe stem Ø 14 mm, length 170 mm. Equipped with SICRAM module, spares of braid and 50 cc of distilled water. **Used for WBGT measurement.**

HP3217.2R: Combined temperature and relative humidity probe. Capacitive RH sensor, Pt100 temperature sensor. Probe stem Ø 14 mm, length 150 mm. Equipped with SICRAM module. **Used for PMW and PPD measurement.**

AP3203.2: Omni-directional hot wire probe. Measuring range: air speed 0.1÷5 m/s, temperature 0÷80 °C. Probe stem Ø 8 mm, length 230 mm. Equipped with SICRAM module. **Used for PMW and PPD measurement.**

Probes for HD32.3 version A (with cable):

TP3207: Temperature probe with Pt100 sensor. Probe stem Ø 14mm, length 150mm. Cable 2m long. Equipped with SICRAM module. Used for the calculation of the following indices: **PMV, PPD, WBGT.**

TP3275: Globe thermometer sensor Pt100, globe Ø 150 mm. Stem Ø 14 mm, length 110 mm. Cable 2m long. Equipped with SICRAM module. **Used for Mean radiant temperature, WBGT.**

HP3201: Natural wet bulb. Pt100 sensor. Probe stem Ø 14 mm, length 110 mm. Equipped with SICRAM module, spare braid and 50 cc of distilled water. **Used for WBGT measurement.**

HP3217R: Combined temperature and relative humidity probe. Capacitive RH sensor, Pt100 temperature sensor. Probe stem Ø 14 mm, length 150 mm. Equipped with SICRAM module. **Used for PMV and PPD measurement.**

AP3203: Omni-directional hot wire probe. Measuring range: air speed 0.1÷5 m/s, temperature 0÷80 °C. Probe stem Ø 8 mm, length 230 mm. Equipped with SICRAM module. **Used for PMV and PPD measurement.**

Accessories:

VTRAP30: Tripod to suit instrument with a maximum height of 280 mm

HD32.2.7: Probe holder, **to be fixed on standard tripod. For version HD32.2A.**

HD2110RS: Connection cable with M12 connector from the instrument side and with SubD female connector 9 poles for RS232C from PC side.

HD2110USB: Connection cable with M12-8 poles that attaches to instrument side and USB 2.0 on PC side.

SWD10: 100-240Vac/12Vdc-1A mains voltage stabilized power supply.

AQC: 200cc. of distilled water and n° 3 braids for HP3201 or HP3201.2 probes

HD40.1: 24-column portable printer (uses **HD2110RS** cable)

BAT.40: Spare battery pack for HD40.1 printer with built-in temperature sensor.

RCT: The kit includes 4 thermal paper rolls, wide 57mm, diameter 32mm.