

HD32.2, HD32.2A, WBGT Index



HD32.2 | HD32.2A INSTRUMENT FOR THE ANALYSIS OF THE WBGT INDEX

HD32.2 – WBGT Index is an instrument 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.

The instrument is equipped with three inputs for probes with SICRAM module: the probes have an electronic circuit that communicates with the instrument and stores the sensor calibration data. 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 T_g .
- Wet bulb temperature with natural ventilation T_{nw} .
- Environment temperature T_a .

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:

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

- outside a building in presence of solar radiation:

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

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.**

Reference standards:

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



HP3201.2

TP3276.2

TP3207.2

Technical specifications	
Power supply	4 x 1.5 V AA size alkaline batteries 12 Vdc/1 A external power supply unit (SWD10)
Battery life	200 hours of continuous operation with 1800 mAh batteries Current consumption when the instrument is off <45 µA
Logging interval	Configurable 15/30 seconds, 1/2/5/10/15/20/30 minutes, 1 hour
Storage capacity	67,600 entries for each of the 3 inputs The memory is divided in 64 blocks
Inputs	3 inputs with 8-pole DIN45326 connector for probes with SICRAM module
Display	Backlit dot matrix LCD Visible area 52x42 mm, 160x160 pixels
Connectivity	RS232C or USB 2.0, 8-pole M12 connector
Uncertainty	± 1 digit @ 20 °C (only the instrument)
Operating conditions	-5...50°C 0...90 % RH no condensation
Storage temperature	-25...65°C
Materials	ABS, rubber protection band
Dimensions	185 x 90 x 40 mm
Weight	470 g (complete of batteries)
Protection degree	IP64

Probes technical specifications

Temperature probe TP3207.2 or TP3207

Sensor	Pt100
Measuring range	-40...100 °C
Resolution	0.1°C
Accuracy	Class 1/3 DIN
Temperature drift @20°C	0.003%/°C
Long term stability	0.1°C/year
Connection	8-pole female DIN45326 connector Cable L=2 m (only TP3207)
Dimensions	Ø=14 mm L=140 mm (TP3207), L= 150 mm (TP3207.2)
Response time T ₉₅	15 minutes

Globe thermometer probe TP3276.2 and TP3275

Sensor	Pt100
Measuring range	-30...120 °C
Resolution	0.1°C
Accuracy	Class 1/3 DIN
Temperature drift @20°C	0.003%/°C
Long term stability	0.1°C/year
Connection	8-pole female DIN45326 connector Cable L=2 m (only TP3275)
Globe dimensions	Ø=150 mm (TP3275), Ø=50 mm (TP3276.2)
Stem dimensions	Ø=14 mm, L=110 mm (TP3275) Ø=8 mm, L=170 mm (TP3276.2)
Response time T ₉₅	15 minutes

Natural ventilation wet bulb probe HP3201.2 or HP3201

Sensor	Pt100
Measuring range	4 °C...80 °C
Resolution	0.1°C
Accuracy	Class A
Temperature drift @20°C	0.003%/°C

Long term stability	0.1°C/year
Connection	8-pole female DIN45326 connector Cable L=2 m (only HP3201)
Dimensions	Shaft: Ø=14 mm, L=110 mm (HP3201) / 170 mm (HP3201.2) Reservoir: Ø=30 mm, L=35 mm
Cotton wick length	10 cm approx.
Reservoir capacity	15 cc, autonomy 96 hours @ RH=50% and t=23 °C
Response time T ₉₅	15 minutes

Natural ventilation wet bulb probe TP3204S

Sensor type	Pt100
Measuring range	4 °C...80 °C
Resolution	0.1°C
Accuracy	Class A
Temperature drift @20°C	0.003%/°C
Long term stability	0.1°C/year
Connection	8-pole female DIN45326 connector, cable L=2 m
Dimensions	L x W x H = 140 x 65 x 178,5 mm (reservoir + bottle)
Cotton wick length	10 cm approx.
Reservoir capacity	500 cc, autonomy 15 days @ t=40 °C
Response time T ₉₅	15 minutes

ORDERING CODES

The instrument is supplied with 4 x 1.5 V AA size alkaline batteries and carrying case.

The HD32.2A version is supplied with an additional hook-type battery cover for mounting on the SP35TC holder.

DeltaLog10 software is downloadable from website.

Probes, SWD10 external power supply and cables for connection to PC and printer must be ordered separately.

Probes with SICRAM module:

The probes necessary for WBGT index measurement are:

- Dry bulb temperature probe, one of the following:
 - **TP3207.2** Ø 14mm, L=150 mm.
 - **TP3207** Ø 14mm, L=140 mm. Cable 2 m.
- Globe thermometer probe, one of the following:
 - **TP3276.2** Globe Ø 50 mm. Stem Ø 8 mm, L=170 mm.
 - **TP3275** Globe Ø 150 mm. Stem Ø 14 mm, L=110 mm. Cable 2 m.
- Natural ventilation wet bulb temperature probe, one of the following:
 - **HP3201.2** Stem Ø 14 mm, L=170 mm.
 - **HP3201** Stem Ø 14 mm, L=110 mm. Cable 2 m.
 - **TP3204S** For long-lasting measurements. 500 cc distilled water capacity. Cable 2 m.

Accessories

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

VTRAP: Tripod, max. height 1310 mm (SP35TC support not included)

SP35TC: Holder for instrument and 4 probes with cable. It can be fixed to both VTRAP30 tripod and VTRAP tripod.

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

HD2110USB: Cable for connection to PC, with M12 connector (instrument side) and USB type A connector.

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

HD40.1: Serial printer (HD2110RS cable is required).

AQC: 200cc. of distilled water.