General Catalog

indoor

Systems

IEQ
monitoring
systems

LSI LASTEM

Milano
ITALIY

IEQ monitoring systems

Data logger, sensori e software per la valutazione
della "Indoor Environmental Quality".

The physical environment is made up of many elements connected by a complex relationship. Each occupant receives stimuli from the different environmental components like climate, air chemical quality, light and noise and reacts defining a higher or lower environment comfort and thus defining his psychophysical status. Understanding Indoor Environmental Quality (IEQ) helps designers, architects and industrial hygienists creating more comfortable environments from the point of view of the psychophysical wellbeing of the occupants.

Since 1970, LSI LASTEM produces instruments for the complete evaluation of thermal sensation, light quantity, pollutants in the environments and ventilation, always in the perspective of the occupants and their wellbeing.

IEQ monitoring systems (Indoor Environmental Quality)

Applications:
- Evaluation of technical and architectural elements with respect of their capacity of creating optimal environmental quality in a building.
- Evaluation of air quality with respect to artificial or natural ventilation.
- Integration of natural and artificial light for optimal illumination.
- Regulate thermal plants to create optimal thermal comfort with the least expenditure of energy.

Environmental Comfort

The instruments described in this document allow to evaluate the "Indoor environmental quality" (IEQ), combining under a single concept the effects of thermal, light, noise and chemical comfort.

Thermal environments

When designing an indoor environment and its thermal plant, analyzing the relations between plant design, architectural solutions and the indoor microclimate of the building in order to assure thermal comfort and optimize energy consumptions. The thermal sensation of a subject is essentially connected to the hygrothermometric quantities, to the performed activity and to the level of clothing. These variables can be analyzed together through the microclimatic and thermal comfort theory, translating these concepts in quantitative, unequivocal results, objective and so comparable. Special microclimatic indexes can also help to evaluate localized discomfort sources such as floor temperature, draught and radiant asymmetry (ISO7730).

Air quality and ventilation

The air quality inside a building can be assured by low emissions of polluting elements but, also, with correct ventilation. Our instruments allow to measure both gas quantity and ventilation (natural or artificial), to maintain high degrees of air healthiness minimizing, at the same time, energy consumptions for air conditioning. Moreover, the evaluation of air flows and of the quality of air changes allows to determine the efficiency of ventilation plants and annoying localized air draughts, measured through a dedicated index: percentage of dissatisfied by air draughts (ISO7730).

Illumination

The quantity and quality of natural light received by an indoor environment improves the psychophysical status of the occupants. At the same time, an excessive quantity of natural light can create dazzle and reflections, reducing visual comfort. Moreover, a light with a high radiant component can compromise thermal comfort. Our instruments can help optimize light quantity and with "multi-point measurement"concept, evaluate spacial differences and the available quantity of natural light. The radiant load and its influence on thermal comfort is quantifiable measuring the radiant asymmetries and calculating the relevant index: percentage of dissatisfied by radiant asymmetry (ISO7743).

Introduction

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LSI

Understanding indoor environmental quality helps to **create more comfortable environments** from the point of view of the psychophysic wellbeing of the occupants.

IEQ monitoring systems (Indoor environmental quality)

Highlights

- Systems for portable or fixed measurements.
- Measurements of the thermo-hygrometrical, radiant and ventilation characteristics of the indoor environment.
- Measurements of concentration of the main gases (CO, CO2, VOCs, etc)
- Measurement of light quantity
- Calculation of the indices for thermal moderate environments PMV-PPD, TO.
- Calculation of the indices of local thermal discomfort: unsatisfied by air draughts, floor temperature and radian asymmetries.
- Calculation of the number of air changes and air flows.
- Thanks to radio technology, possibility of performing simultaneous multi-point measurements in different positions.
- Possibility to integrate meteorological measurements from an external station.
- Through LSI-Lastem software data can be sent to PC for analysis and storage, or to the building control system via Modbus protocol.

LSI LASTEM instruments support multi-measurement and, thanks to radio technology, also multi-point. Each data-logger (M-Log or R-Log) can be connected to a great variety of sensors. M-Log can be connected only to cable probes, while R-Log can be connected either to cable and radio probes. This solution allows R-Log to receive data from more places at the same time, each with its own set of sensors, thus becoming a complete system for the environmental analysis for short, medium and long periods. M-Log (directly) and R-Log (using aditional interface) can be connected to the building control system (Building automation) via Modbus output; in this case, the instantaneous values of the measurements and the derived calculations made by the instrument are available to regulate the technical plants of the building.

Main Features

Multi-parameter system
R-Log and M-log instruments automatically recognize the connected sensors, allowing the system to be used with a great variety of probes for a complete environmental monitoring. The models are equipped with 5 inputs. Four inputs are for analogue probes (thermocouples, potentiometers, sensors with mV outputs). One input is for sensors with pulse output (0-4 Hz).

Multi-point system
Thanks to radio technology, the R-Log range allows connection of several "Slave" radio modules in different points of the environment and to manage them simultaneously through the "Master" unit, storing all the data and transferring them to the PC.

Portable or fixed system for long term monitoring
All the instruments can be connected to one or more stands for portable measurements and, thanks to the low consumption and to the an internal battery, they can have a long energy autonomy. For long-term measurements, radio modules and probes can be connected to arms fixed to the wall or can be placed on shelves.

Digital outputs for building automation
The M-Log range can be connected to building management systems with Modbus protocol output. The instrument can output instantaneous values and/or moving averages on RS232-485 line or ethernet. An R-log network can use an M-log module as Modbus interface.

Radio
R-log is equipped with a ZigBee radio with power of 10 mW and frequency of 2,4 GHz, requiring no permission or licence. The covered distances can vary according to the kind, position and thickness of the obstacles between two radios. In the open field the maximum distance is of about 500 mt, but this can diminish in case of obstacles. R-log modules with repeater function allows to increase the traveled distance.

Remote control by modem
Data-loggers can be connected to a remote PC with GSM/GPRS modems. Thus, it is possible to check the measurements and download data for their analysis without being on site.

◀ KIT 1.0 Multi measurement portable IEQ system

Portable system for non-simultaneous measurements of:
- Thermo-hygrometric quantities: air temperature, radiant temperature and relative Humidity.
- Ventilation: air speed measurement and calculation of air flows and air change.
- Air quality (CO, CO2, VOCs)
- Illumination
- Local calculation of the indices: TO (operative temperature), % dissatisfied by floor temperature, air flows and radiant asymmetry.
- Calculation on PC (post-processing) of the indices of thermal comfort PMV-PPD.

Option: GSM/GPRS modem.

◀ KIT 1.1 Multi-measurement and multi-point radio portable IEQ system

Modular portable system for the simultaneous measurement of:
- Thermo-hydrometrical quantities: air temperature, radiant temperature and relative humidity.
- Ventilation: air speed measurement and calculation of air flows and air change.
- Air quality (CO, CO2, VOCs).
- Illumination.
- Local calculation of the TO index (Operative Temperature) % dissatisfied by floor temperature, air flows and radiant asymmetry.
- Calculation on PC (post-processing) of the indices of thermal comfort PMV-PPD.

Option: GSM/GPRS modem.

Each module is used for one of the measurement types; when it is necessary to measure the same kind of quantity in different parts of the building, it is possible to add more modules of the same kind to the system.

◀ KIT 1.2 Multi-measurement IEQ fixed system

Fixed system for the contemporay measurement of:
- Air temperature, radiant temperature and relative humidity.
- Ventilation: air speed measurement and calculation of air flows and air change.
- Local Calculation of the TO index (Operative temperature).
- RS485 connection to building management systems via Modbus.

The system is modular; it is possible to connect more sensors and/or add other modules with the same kind of communication. The choice may also includes a meteorological station to be mounted on the building (see catalogue "Professional Meteorological stations").

IEQ monitoring systems

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Code	Description	KIT 1.0	KIT 1.1	KIT 1.2
	Data logger			
ELO510M	R-Log data logger MASTER. 5 inputs. Connection to sensor by radio and cable		●	
ELO009	M-Log data logger. 5 input. Connection to sensor by cable	●	Note 8	●
	Radiant temperature			
EST131	Black globe thermometer, by cable	●		●
ELR205	Black globe thermometer, by radio		●	
	Air temperature and Relative Humidity			
ELR200	Thermohygrometer, by radio		●	
DYA235	Radiant screen with forced ventilation for ELR200 sensor		Note 5	
ESU403.1	Thermohygrometer (capacitive hygrometer) by cable	●		●
	Air speed module			
ELR510S	R-Log data logger SLAVE. 5 inputs. Connection to sensor by cable		● Note 6	
ESV107	Hot wire anemometer, by cable	●	●	●
ESV106	Hot wire anemometer by cable. Turbulence measurement	Note 1	Note 1	
BVA304	Tripod		●	
BVA311	Arms for sensors and data logger on tripod		●	
	Indoor Air Quality module			
ELR510S	R-Log data logger SLAVE. 5 inputs. Connection to sensor by cable		● Note 6	
ESO141#C	CO_2 sensor. With calibration certificate	●	●	
ESO101#C	CO sensor. With calibration certificate	●	●	
ESO150#C	VOCs sensor. With calibration certificate	●	●	
BVA304	Tripod		●	
BVA311	Arms for sensors and data logger on tripod		●	
	Illuminance module			
ELR510S	R-Log data logger SLAVE. 5 inputs. Connection to sensor by cable		● Note 6	
ESR001#C	Lux sensor. Range 0…25.000 lux. With calibration certificate.	●	●	
ESR007#C	Lux sensor. Range 0…100..000 lux. With calibration certificate.	● Note 2	● Note 2	
BVA304	Tripod		●	
BVA311	Arms for sensors and data logger on tripod		●	
	Local discomfort module			
ELR510S	R-Log data logger SLAVE. 5 inputs. Connection to sensor by cable		● Note 6	
EST130	Floor temperature sensor. Permits calculation of the People dissatisfied by Floor temperature index (ISO7730).	●	●	
ESR231	Net radiometer. Permits calculation of the people dissatisfied by Radiant asymmetry index (ISO7730). Uses n.2 inputs	●	●	

Code	Description	KIT 1.0	KIT 1.1	KIT 1.2
	Accessories			
EZB321.1	Radio signal repeater		● Note 9	
BSC015	220Vac-12Vdc power supply module and battery charger	●	●	●
BVA304	Tripod	●		
BVA311	Arms for sensors and data logger on tripod	●		
BVA313	Arms for sensors and data logger on wall			●
BWA314	Carrying case		●	
BWA316	Carrying case	●	●	
BWA048	Bag for tripod and arms	●	●	
ELA708	GSM/GPRS modem	Note 3	Note 3	
ELA112	Cable for ELA708 to data logger	Note 3	Note 3	
DEA504	RS232/485 interface			● Note 7
	PC programs			
BSZ311	Data management program	●	●	
BSZ313	TEA module for comfort environments. PMV-PPD index calculation. Calculator	●	●	
	Calibration certificates	Note 4	Note 4	Note 4
DZC401S	Hot wire anemometer calibration certificate: ISO type			
CSIT.9	Hot wire anemometer calibration certificate: ACCREDIA type			
CSIT.T15	ESU403.1 or ELR200 thermohygrometers calibration certificate: ACCREDIA type for temperature and ISO for Relative humidity			
CSIT.T20	EST131, EST205 thermometer calibration certificate: ACCREDIA type			
DZC501S	Certificato calibrazione ISO per sonde GAS			

Nota 1   Add ESV106#C hot wire anemometer when air speed and air turbolence are required to calculate "% of people disatisfied by draft" index (ISO7730) on the data logger.

Note 2   Add ESR007#C lux sensor in case of strong illuminance from outside. This sensor can be use together with ESR001#C when calculation of "lighting factor" is required.

Note 3   Option. It is possible to connect the Mlog and Rlog data loggers to PC using GSM modem. The 3DOM software, included with every RLog MASTER and Mlog data logger, allows direct or remote data download.

Note 4   Option. All the sensors come with a Test Report. Some of the them come with its own calibration certicate (suffix #C). It is possible to add ACREDIA (EN 17025) or ISO type calibration certificates.

Note 5   Add DYA235 radiant screen in case of use of ELR200 sensor in presence of high radiant sources.

Note 6   Every R-Log SLAVE can receive up to n.4 signal from phisically connected wired sensor. It uses its radio to transmit the measurements to an R-Log MASTER module where all the measurements are stored.

Note 7   M-Log can transmit measurements via RS232 using Modbus, TTY or LSI LASTEM protocols. Unit DEA504 allows conversion to RS485.

Note 8   To obtain Modbus output from R-Log MASTER, add one M-Log connected by RS232 cable. M-Log converts the instant values received from the R-Log into Modbus messages.

Note 9   Radio signal repeater unit. Add it to extend distance between MASTER and SLAVE units. Each repeater requires BSC015 power supply module.

Data logger and radio receiver/repeater units

Technical features - MODELS

M-Log Data Logger

Portable data logger for thermal environment monitoring with self-recognition of connected sensors. Four analog and one pulse input. ELO009 can be installed on tripods along with sensors for portable, short- and long-term applications. The memory capacity of ELO009 ensures long-lasting data storage.

Order numb.		**ELO009**
Inputs	Analog	N. 4
	Digital	N. 1
	Sensors self-recognizing	Yesi
Power supply	Power supply	8-14 Vdc
	Battery	2 A (4,2 V) Lithium rechargeable
General information	Inner calculations	For thermal environment index without PC
	Memory	2 Mb. Flash
	Display	For instant values and diagnostic
	Remote PC connection	GSM modem (option)
	Serial port	N.2 RS232
	Protocolli	LSI proprieties, Modbus, TTY

R-Log MASTER radio data Logger

Data logger for thermal environment monitoring for sensors connected via radio or directly connected via cable. ELR510M receives instant values and stores them in statistical values form for PC applications

Order numb.	**ELO510M**	
Inputs	Inputs	N.5 from cabled connection sensors N.55 total channels from SLAVE units and cabled sensors
	Analog	N. 4
	Digital	N. 1
	Sensors self-recognizing	Yes
Power supply	Power supply	8-14 Vcc
	Battery	2 A (4,2 V) Lithium rechargeable
Radio	Function	Receive measurement from SLAVE units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
General information	Memory	2 Mb.Flash
	Display	For instant values and diagnostic
	Inner calculations	For thermal environment index without PC
	Remote PC connection	GSM modem (option)
	Serial port	N.1 RS232

Data Logger

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R-Log radio MASTER Data Logger with Ethernet port

MASTER unit with built-in Ethernet port for communication over LAN to remote PC.

Ideal to cover long distances in cabled environments and to allow connection to multiple PCs in the same network. This solution allows also the creation multiple monitoring sub-networks, each one using one ELO511M as Master.

Order numb.		**ELO511M**
Inputs	Inputs	N.5 from cabled connection sensors N.55 total channels from SLAVE units and cabled sensors
	Analog	N. 4
	Digital	N. 1
	Sensors self-recognizing	Yes
Power supply	Power supply	8-14 Vcc
	Battery	2 A (4,2 V) Lithium rechargeable
Radio	Function	Receive measurement from SLAVE units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
General information	Memory	2 Mb.Flash
	Display	For instant values and diagnostic
	Inner calculations	For thermal environment index without PC
	Ethernet port	RJ45 connector, TCP/IP socket server

R-Log radio SLAVE data Logger

For the connection of cabled thermal environments sensors and radio link to MASTER data logger.

Order numb.		ELO510S
Inputs	Inputs	N.5 from cabled connection sensors
	Analog	N. 4
	Digital	N. 1
	Sensors self-recognizing	Yes
Power supply	Power supply	8-14 Vcc
	Battery	2 A (4,2 V) Lithium rechargeable
Radio	Function	Send measurement to MASTER units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
General information	Memory	2 Mb.Flash
	Display	For instant values and diagnostic
	Inner calculations	For thermal environment index without PC

Radio repeater

Ideal to increase the range of transmission between SLAVE and MASTER units. Nominal range is 500 m (line-of-sight). If you are experiencing signal loss due to distances and/or obstacles (like walls), you can add one or more (up to 12) repeaters. Inside buildings, we recommend the installation of repeaters when the distance between SLAVE and MASTER units exceeds 20-40 m. EZB321.1 requires connection to the main power supply for his operation.

Order numb.		EZB321.1
Radio	Function	Receive measurement from SLAVE units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
Power supply	Power supply	8-14 Vdc
	Battery	2 A (4,2 V) Lithium rechargeable

Data Logger

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Floor and ankles temperature sensor
Technical features - MODELS

Floor and ankles temperature sensor

Sensor to measure floor surface temperature and air temperature at 20cm from floor. These quantities are needed for the calculation of local discomfort indexes (ISO7730 standard): Percentage of people dissatisfied by floor temperature and Percentage of people dissatisfied by temperature vertical differences (the latter parameter requires also one air temperature probe placed at 120cm of height).

Order numb.	EST130	
Floor and ankle temperature	Principle	N.2 Pt100 1/3 DIN A.
	Measuring range	-10÷+50°C
	Uncertainty	0,15°C (0°C)
	Output	Ω DIN-IEC 751 table
	Resolution	0,01°C
	Response time (T90 H$_2$O)	3,5 min. floor surface temperature 6 min. air temperature

Black-globe thermometer sensor

Sensor designed according to ISO 7726 standards. Radiant temperature (Tg), along with air temperature, allows calculation of the Mean radiant temperature (Tr) and determination of Radiant thermal loads, critical parameters in the analysis of moderate and hot environments. Radiant temperature is also indispensable for the calculation of the following indexes: Operative temperature, PMV, PPD (ISO7730), PHS (ISO7933) and WBGT (ISO7243).

Order numb.	EST131	
Black globe temperature	Principle	Pt100 1/2 DIN A
	Measuring range	-40÷+80°C
	Uncertainty	0,15°C (0°C)
	Output	Ω DIN-IEC 751 table
	Resolution	0,01°C
	Response time (T90 Air)	20 min.

Radio black-globe thermometer sensor

Sensor designed according to ISO 7726 standards. It has same physical and measuring features of EST131. This is the ideal solution to save physical inputs on R-Logs, using radio communication with "Master" units. When connected to ESU121 sensor, the unit becomes a stand-alone WBGT-meter (according to ISO7243 indoor formula); this is a very light solution to implement networks of WBGT-meters for on-line heat stress monitor.

Order numb.		EST205
Black globe temperature	Standard	ISO7726
	Principle	Pt100 1/2 DIN A
	Measuring range	-20÷+80°C
	Uncertainty	0,15°C (0°C)
	Resolution	0,01°C
	Response time (T90 Air)	20 min.
Radio	Function	Send measurement to MASTER units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
General information	Memory	2 Mb. Flash (backup)
	Output (programmable)	Ist., Min, Max, Average, Dev.Standard values
	Power supply	8-14 Vdc
	Battery	2 A (4,2 V) Lithio rechargeable
	Input	N.1 Pt100 (ESU121 sensor) using ELA130 cable

Thermohygrometer
This sensor combines air temperature (Pt100 1/3 DIN B) and relative humidity (hygro-capacitive film) measurement. The advantages of this sensor, when compared with a psychrometric probe, are its low energy consumption (with no forced ventilation) and absence of water for wet bulb temperature measurement; these two features make this sensor ideal for long-term measurements in on-line applications.

Order numb.		**ESU403.1**
Temperatura	Principle	Pt100 1/3 DIN B
	Measuring range	-50÷+70°C
	Uncertainty	0,1°C (0°C)
	Resolution	0,01°C
	Response time (T90)	3 min. with filter 20 sec. without filter (0,2 m/s air speed)
Relative humidity	Principle	Capacitive
	Measuring range	0-100%
	Uncertainty	±1,5% RH (5-95%)
	Response time (T90)	10 min. with filter 1 min. without filter (0,2 m/s air speed)

Thermohygrometric sensor (radio)

Wireless sensor for measuring temperature (PT100 ½ DIN type) and Relative Humidity (plus Dew Point calculation). This is the ideal solution to save physical inputs on R-Logs, using radio communication with "Master" units. ESR200 can be equipped with a forced ventilation radiant screen (DYA235) useful in high radiant and low air flow measurement conditions.This is also a very light solution to implement networks of thermohygrometric sensors for on-line monitor either by sending data via radio to a R-Log MASTER data logger, where they are stored, or connected to a receiver (EZB311-312) for the management of data directly on a PC.

Order numb.		**ELR200**
Temperature	Principle	Pt100 1/2 DIN A
	Range	-20÷+60°C
	Uncertainty	0,5°C (+5…+45°C)
	Resolution	0,01°C
	Response time (T90 air)	30 s. (0,2 m/s air flow)
RH%	Range	0-100%
	Uncertainty	±2% RH (5-95%)
	Resolution	0,01°C
	Response time (T90 air)	8 s
Radio	Function	Send measurement to MASTER units
	Type	ZigBee
	Frequency	ISM 2.4 GHz direct sequence channels
	Power	10 mW (+10 dBm)
General information	Memory	Flash 2 Mb (backup)
	Output (programmable)	Ist., Min, Max, Average, Dev.Standard values
	Power supply	8-14 Vdc
	Power consumption	4 mW
	Battery	2 A (4,2 V) Lithio rechargeable
	Protection	IP54
	Operative temperature	-20÷+60°C
	Calculation	Dew Point
	Mounting	On BVA311-313 stands

Temperature and Relative Humidity sensors

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Luxmeter for portable applications
Luxmeter probe to measure illuminance in indoor applications according to the response of the human eye (Vlamba CIE curve).

Order numb.	ESR000#C	ESR001#C	ESR003#C#C
Measurement range	0÷5000 lx	0÷25.000 lx	0.÷100.000 lx
Resolution	0,5 lx	3 lx	10 lx

Common features

Lux	*Principle*	Photodiode
	Spectral range	Human eye response (Vlambda CIE)
	Uncertainty	3%
General information	*Power consumption*	5 mA
	Protection	IP65
	Cable	L.2 m
	Connector	Mini-din
	Input type on E/M/R-Log	N.1 analog
	E/M/R-Log derived quantities obtained	Day light factor (using n.2 lux meters)
	Mounting	On BVA311-313 stands
	Calibration certificate	DZC201.S included
	Data logger compatibility	M-Log (ELO009), R-Log (ELR510)

Air speed sensor
Technical features - MODELS

Hot wire anemometer

Portable hot wire anemometer for measuring mean air speed (va).
ESV107 measure the air speed only, using one sample every 100 ms and update output every one sec.
ESV106#C calculates also turbolence intensity (TU) in compliance with ISO7726 using air speed measurement sampled every 100 ms, a rate allowing calculation of *Average air speed* (va), standard deviation and *Turbulence index* over 1 second. The reading is then updated every second with a running average over the previous 5 sec.
These sensors can be used in indoor environments, ducts, ventilation outlets. It can be hand-held or it can be mounted on a tripod during longer measurements.
When the support for the directional measurement is removed, this sensor has a good response to plane omnidirectional air flow which arrive on the hot wire from any directions within 300°.

Order numb.	ESV106#C	ESV107
Measurement	Air speed (m/s) + air Turbolence (%TU)	Air speed (m/s)
Connector	Double min-din	Mini-din
Input type on E/M/R-Log	N.2 analog	N.1 analog
E/M/R-Log derived quantities obtained	Air flow, N.air changes Draught rate index (ISO7730)	Air flow, N.air changes
Calibration certificate	DZC401.S included	

Common features

Anemometer	Principle	Hot wire
	Measuring range	0.01÷20 m/s
	Uncertainty (10÷30°C) (1013 hPa)	0÷0,5 m/s = NA 0,5÷1 m/s = ± (0,05+0,05 Va) m/s >1 m/s= ± (0,1+0,05 Va) m/s
	Threshold	0,01 m/s
	Resolution	0,01 m/s
	Response time	0,1 sec.
	Sampling rate	10 Hz
	Data output (Va and TU)	Every n.1 sec: running average over last 5 sec.
	Directional	Within 300° arc
General information	Standard	ISO7726 - with the exception of the omnidirectionality (obtained over a range of a 300° arc) and precision in the 0÷1 m/s range
	Protection type	IP54
	Power consumption	70 mA
	Operative temperature	-20÷+60°C
	Cable	L.1 m
	Mounting	On BVA311-313 stands
	Output	60÷300 mV
	Power supply	9 Vdc
	Data logger compatibility	M-Log (ELO009), R-Log (ELR510)

Radiometro netto per asimmetria radiante

Sensor in compliance to ISO7726 standard. ESR231 is a net radiometer used to calculate the Radiant Asymmetry and other related quantities.
Radiant asymmetry concept is introduced when thermal loads, coming from opposite directions, creating discomfort that reduces the thermal comfort of the occupants. In this case ISO 7730 standard suggests the use of this probe for the calculation of the *percentage of people dissatisfied by radiant asymmetry*.
To perform these calculations, M/R-Log required even a temperature probe.

Order numb.	**ESR231**	
Thermal flow between two semi-areas of the environment	*Principle*	Termopile
	Spectral range	0,3÷50 µm
	Uncertainty	3%
	Output	µV/W/m²
	Range	-1500÷+1500 W/m²
General information	*Housing*	Anodised aluminium,
	Protection	IP54
	Operative temperature	-30÷70°C
	Cable	L.1 m
	Connector	Double min-din
	Input type on E/M/R-Log	N.2 analog
	E/M/R-Log derived quantities obtained	- Planar radiant asymmetry - Planar radiant mean temperature - Planar temperature - People dissatisfied by radiant asymmetry (ISO7730)
	Mounting	On BVA311-313 stands
	Data logger compatibility	M-Log (ELO009), R-Log (ELR510)

CO gas sensor
Sensor for measuring Carbon Monoxide in indoor applications.

Order numb.		ES0101C
CO	Principle	Electrochemical cell
	Detectable threshold	1 ppm
	Repeatability (% reading)	1%
	Resolution	0,5 ppm
	Operative temperature	-20÷50°C
	Drift signal loss / month	<5% year
	Temp.coeff. (%signal/°C)	<+0,4
	Typical baseline range in pure air	-1÷3 ppm
	Max zero shift (+20+40°C)	9 ppm
	Response time (T90)	30 sec
General information	Sensor life	3 years
	Power supply	12 Vdc
	Power consumption	10 mA
	Mounting	On BVA311-313 stands
	Calibration certificate	DZC501.S included

Radiant asymmetry | Gas

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VOCs gas sensor
Sensor for measuring Volatile organic compounds.

Order numb.			ES0150#C
VOCs	Range		0÷20 ppm
	Principle		PID
	Uncertainty		3% range
	Resolution		0÷20 ppm : 0,01 ppm Isobutylene response
	Operative temperature		-40÷40°C
	Threshold		0÷20 ppm: <0,01 ppm
	Humidity response		<1 ppm at 90RH%
General information	Output		60÷300 mV
	Cable + connector		L.50 cm + Mini-Din connector
	Data logger compatibility		M-Log (ELO009), R-Log (ELR510)
	Sensor life		1 year
	Power consumption		30 mA
	Output		60÷300 mV
	Input type on E/M/R-Log		N.1 analog
	Mounting		On BVA311-313 stands
	Calibration certificate		DZC501.S included

CO2 gas sensor

Sensor for measuring Carbon dioxide. This sensor uses infrared absorption cell methode.

Order numb.	**ESO141#C**	
CO²	Range	0÷5000 ppm
	Principle	Infrared absorption cell (NDIR)
	Uncertainty (25°C, 1013 hPa)	3% range
	Resolution	± (50 ppm +3% reading value)
	Response time (t90)	< 195 sec
	Temperature dependence	2 ppm CO2/°C (0÷50°C)
	Long term stability	20 ppm / year
	Environmental limits	-20÷60°C, 5÷95UR% (without condensation)
	Calibration certificate	Included

Gas

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PC software

● **SQL**-GIDAS VIEWER

Gidas Viewer is a post-processing solution that allows for data display, management and analysis of the data downloaded by 3DOM and CommNET programs. The user can access data in various tabular and chart form, process data using different time bases, joint together data and instruments. Gidas Viewer is based on a powerful SQL Database for better data security and management, including tools for data backup and storage.

Gidas Viewer SQL database can be installed locally or in PC networks and it is also accessible from third-party software for custom-made software applications and web data display.

Main

- Instrument browser, including all data loggers and surveys for easy data selection;
- Selection of one or more time base for displaying statistical data;
- Reports (table and charts) with measurement selection
- Export data to ASCII table and Excel;
- Fast data query recall for easy reports update using fresh data.
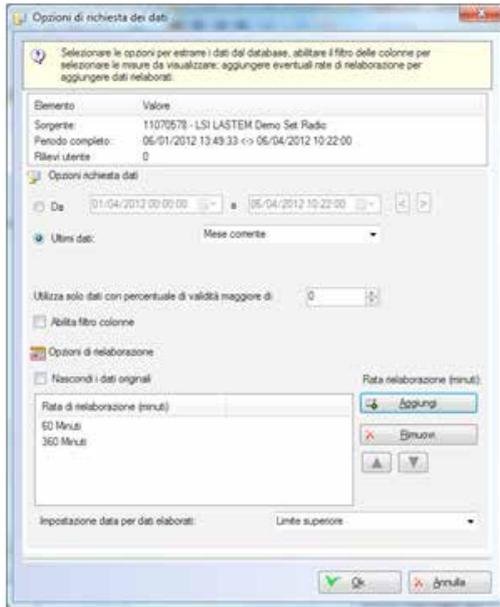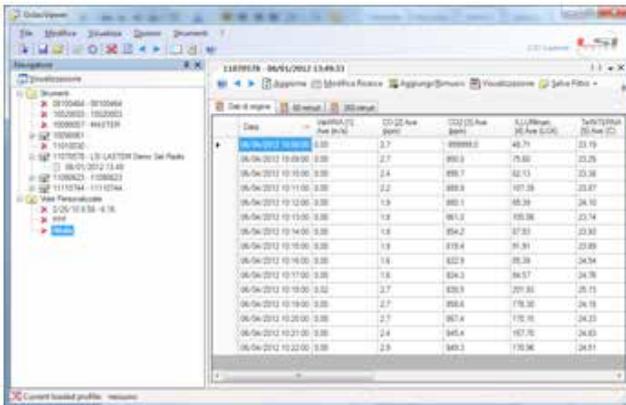
○ interface - **Gidas viewer**

Data selection

- Data selection by date;
- Selection of one or more elaboration time base;
- Selection of measurements to be placed inside the report.
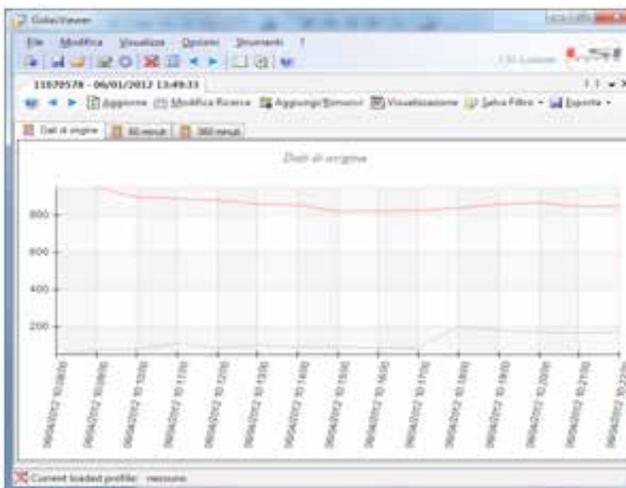
○ interface - **Data selection**

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interface - **Data selection**

Data reports
■ Table;
■ Charts: zoom scroll.

interface - **Data report**

interface - **Data report**

PC Software

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◉ GIDAS - TEA (Thermal Environments Applications)

LSI LASTEM GIDAS TEA (Thermal Environment Application) is a state-of-the-art software suite designed for the most comprehensive thermal analysis available on the market. With the three specific modules of TEA (Moderate/Hot/Cold environment) it is possible to easily carry out ISO index calculations, generate thermal-comfort projects and reports, perform simulations and organize records and results in the database.

BSZ313: Thermal comfort indexes.
Determination and interpretation of thermal comfort using calculations and local thermal comfort criteria for optimal comfort conditions according to the following ISO indexes:
- PMV Predicted mean vote (ISO7730)
- PPD Predicted % of dissatisfied (ISO7730)
- DR Predicted % of dissatisfied by draught (ISO7730)
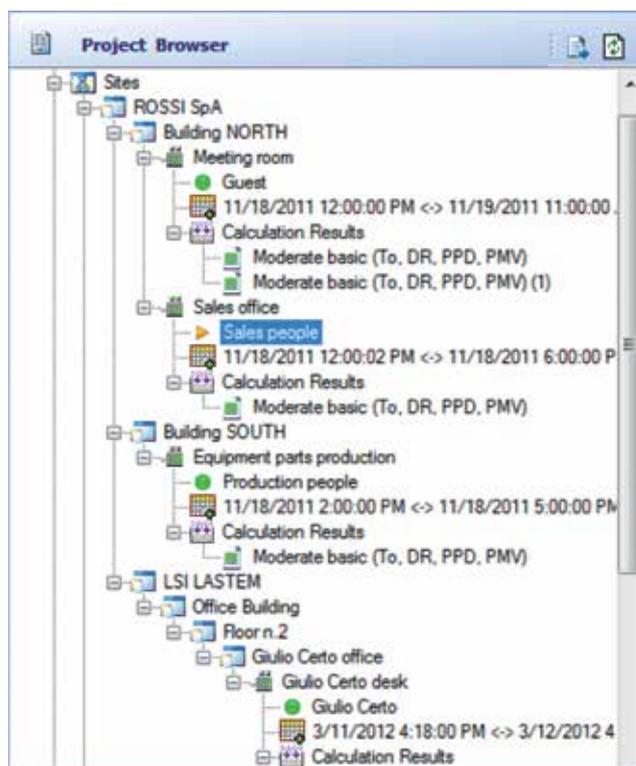- TO Operative temperature (ISO7730)

BSZ315: Cold environments
Determination and interpretation of cold stress when using required clothing insulation and local cooling effects to limit the possible decrease of body temperature according to physical thermoregulation activity.
- ITR required thermal insulation (ISO 11079)

BSZ317: Heat stress
Analytical determination and interpretation of heat stress using calculation of the predicted heat strain to avoid dangerous conditions for the health of hot environment workers.
- WBGT Wet bulb globe temperature. Inside/outside (ISO 7243)
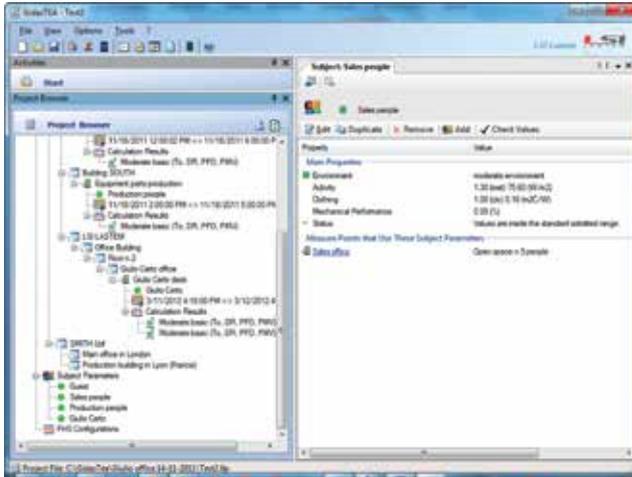- PHS Predicted heat strain (ISO7933:2004)

Environments setup
- Organize each measurement location with record information. (Name, place, description, etc.). One or more subjects can be assigned to every measurement location.
- Index calculation for every measurement location and every subject.

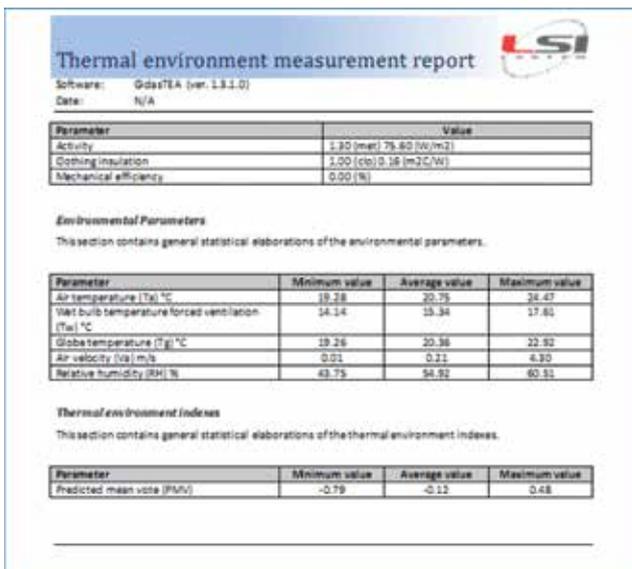◉ interface - **project browser**

interface - **Gidas TEA**

Main
- Data download;
- Measurement site setup;
- Subject parameters (clothing; work efficency and activity) setup;
- Measurement reports, tables, charts and reports;
- Index calculation and in-depth analysis using different subject parameters (sensing analysis);
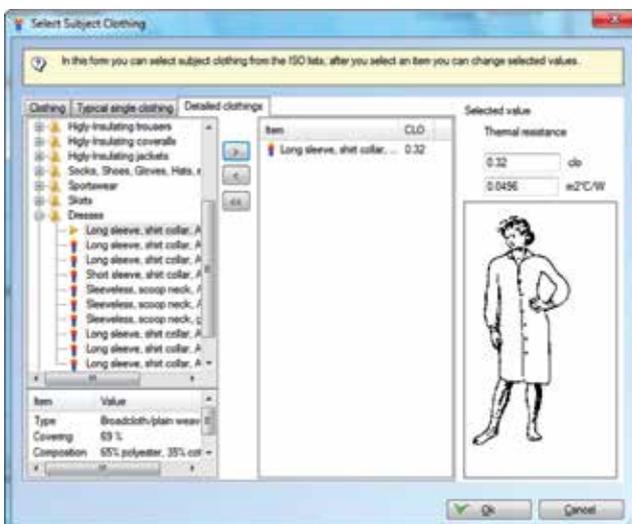- Quick index calculator.

interface - **measurement report**

Final report
- Tables an charts for measured quantities and thermal enviroment indexes.
- Final report, with complete information (measurements positions, subjects, environmental quantities and thermal environment indexes, in charts and summarized tables, with editable records).
- DocX, open office, xml (ECMA-376) document format.

interface - **select subject clothing**

Subject setup
Values setup using tables and pictures from ISO standards, including:

- Subject activity (MET)
- Clothing (Clo)
- Work efficency (ETA)

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Calculator feature

■ Manual entering of Subject parameters (Clo, MET, ETA) and environmental quantities (temperature, RH%, air speed, etc.).
■ Sensing analysis of thermal indexes when editing the entered quantities.
■ Reports in DocX, Open Office xml (ECMA-376) formats.

Reference List
IEQ monitoring systems

Some of the customers who choose our systems for Indoor Environmental applications:
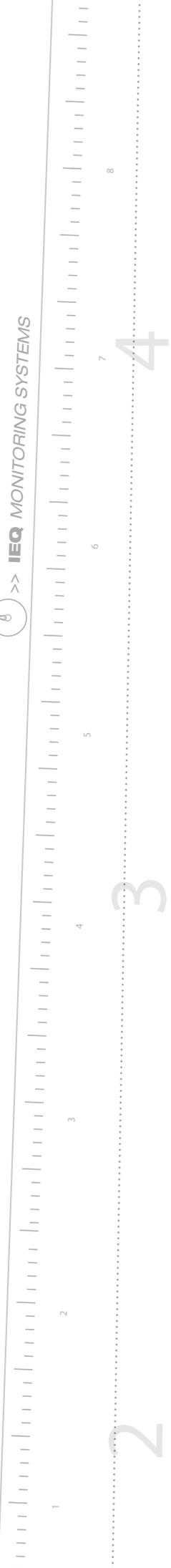
● Italy:

- **CNR Consiglio Nazionale delle Ricerca**
- **Politecnico di Bari** - Bari
- **Studio Tecnico Ambiente & Sicurezza** - Belluno
- **Tecnovia Srl** - Bolzano
- **Università Cattolica** - Roma
- **Università degli Studi di Firenze** - Firenze
- **Università Mediterranea** - Reggio Calabria
- **Università Politecnica delle Marche** – Ancona
- **Università degli Studi di G. D'Annunzio** - Chieti
- **Politecnico di Milano** - Milano
- **Università degli Studi di Napoli "Federico II"** Napoli
- **Università degli Sudi di Napoli "S. U. N."** Napoli
- **Università degli Studi di Padova** - Padova
- **Università degli Studi di Perugia** - Perugia
- **Università degli studi di Reggio Calabria** Reggio Calabria
- **Università degli Studi di Trento** - Trento
- **Tassullo Materiali Spa** - Trento
- **Università degli Studi di Trieste** - Trieste
- **Univ. di Ts Dip.to di Energetica** - Trieste
- **Università degli Studi di Urbino** - Urbino
- **Artec Progetti sas** - Verona
- **Baxi Spa** - Vicenza
- **CSG Palladio Srl** - Vicenza

● Foreign countries:

- **Beijing Institute of Civil Engineering and Architecture** – Cina
- **Beijing University of Technology** – Cina
- **Chongqing University** – Cina
- **Chongqing Institute of Logistics Engineering** Cina
- **Dalian University of Technology** – Cina
- **Donghua University** – Cina
- **Harbin Institute of Technology** – Cina
- **Nanchang University** – Cina
- **North China Electric Power University** – Cina
- **Southwest Jiaotong University** – Cina
- **Shenyang Jianzhu University** – Cina
- **Tianjin University** – Cina
- **Tongji University** – Cina
- **Tsinghua University** – Cina
- **University of Shanghai for Science and Technology** – Cina
- **Wuhan University of Technology** – Cina
- **CRAN, Université de Lorraine, Nancy** – Cina
- **City University of Hong Kong** - Hong Kong
- **Hong Kong Polytechnic University** - Hong Kong
- **Univerisity of Hong Kong** - Hong Kong
- **Universitas Hasanuddin** - Indonesia
- **Malaysia-Japan International Institute of Technology (MJIIT)** - Malesia
- **Jabatan Kerja Raya (JKR)** - Malesia
- **Universiti Malaya (UM)** - Malesia
- **Universiti Putra Malaysia** - Malesia
- **Universiti Sains Malaysia** - Malesia
- **Universiti Technologi Mara (UiTM)** - Malesia
- **Universiti Tun Hussein Onn** - Malesia
- **National University of Singapore**
- **Nanyang University of Singapore**
- **National Kaohsiung First Univerity of Science and Technology National Ilan University** Taiwan
- **Institute of Occupational Safety & Health** Taiwan
- **IndustrialTechnology** – Taiwan
- **National Taiwan University** – Taiwan
- **Taiwan National Farmosa University National Chung Hsing University** – Taiwan
- **Chulalongkorn University** - Thailandia

IEQ MONITORING SYSTEMS

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