LSI LASTEM

Environmental Monitoring Solutions

METEOROLOGICAL EQUIPMENT FOR AIR QUALITY APPLICATIONS

- Meteorological Sensors for AQMS
- Meteorological Station for AQMS

METEOROLOGICAL EQUIPMENT FOR AIR QUALITY MONITORING SYSTEMS

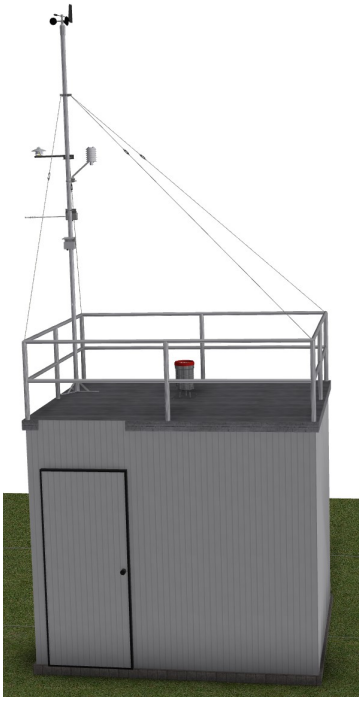
Environmental Monitoring Solutions

Meteorological conditions are important information in Air Quality Monitoring Systems and Networks. As the fate of air pollutants is influenced by the movements and characteristics of the air mass into which they are emitted, no air quality data is complete without an accurate in situ record of meteorological conditions. Atmospheric dynamics determine the formation, transport, deposition and dilution of the pollutant. Primary meteorological variables for AQM applications include Wind Speed, Wind Direction, Air Temperature and Relative Humidity, Atmospheric pressure, Radiation and Rain. The turbulence index of the atmosphere typically refers to the atmospheric stability which is an important information to analyse the deposition and dilution of the pollutant over a certain area. Characterization of atmospheric stability for dispersion modelling purposes involves measurements of temperature, radiation intensity and wind speed.

LSI LASTEM has a long-lasting tradition and experience in this field of application. In the 80s our company supplied the first sensors and acquisition system for wind and atmospheric stability categories evaluation to ENEL (Italian National Authority for Electric Energy) to study plume dynamic in power plants. Over the years, LSI LASTEM has developed strong bonds with many pollution control institutions, air quality analyzers manufacturers and system integrators throughout the world. Nowadays, LSI LASTEM supplies its line of sensors to partners, OEM and distributors in every continent.

Meteorological Sensors for AQMS systems

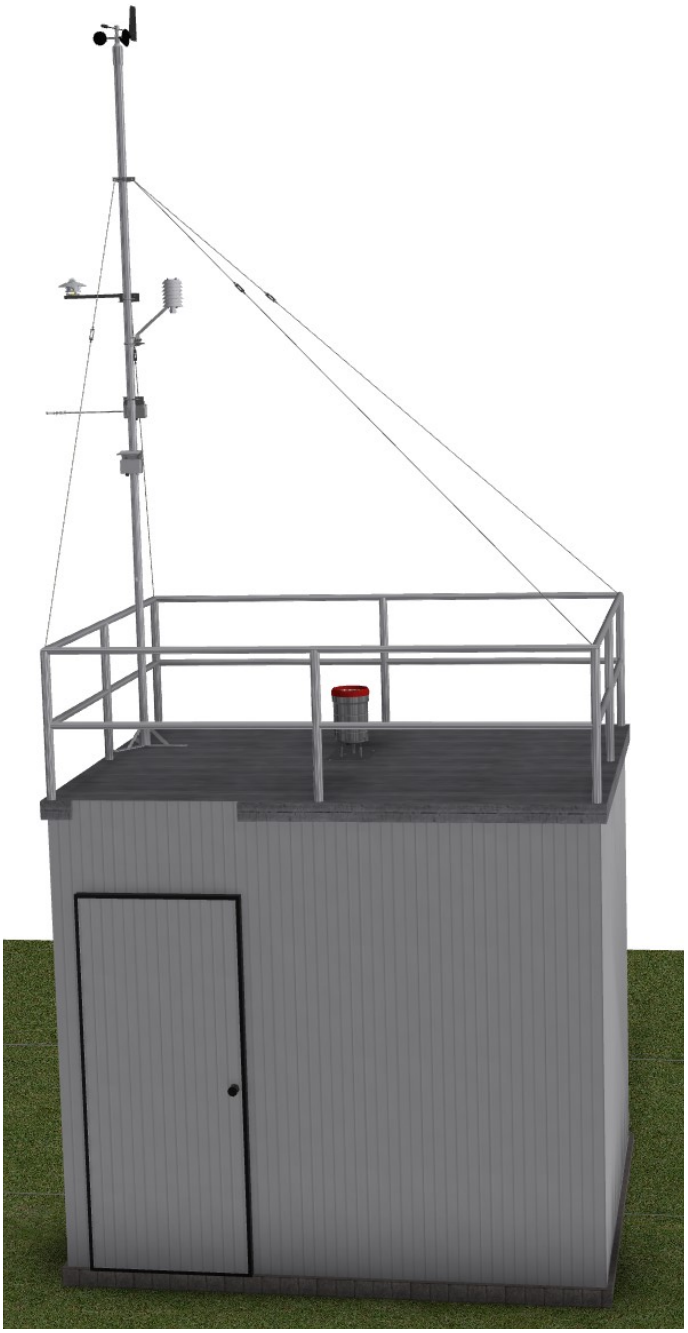
LSI LASTEM designs and manufactures the most complete range of meteorological sensors and solutions specifically dedicated to AQM applications. Our extensive range includes: wind speed, wind direction, temperature & relative humidity, radiation (global and net), atmospheric pressure and rain sensors. All sensors are designed for easy mounting on a pole or tower without the need of any external converter and have connectors in order to choose a cable of the proper length to the data acquisition system.



Meteorological Station for AQMS systems

Sensors can be connected to a data logger to register and collect data. This solution allows the meteorological system to be independent, saving data and transmitting them to remote servers and at the same time to be linked to the local AQMS data acquisition system by Ethernet or RS485 (Modbus protocol).

Meteorological Sensors for AQMS



- Adherence to relevant standards (ISO and WMO)
- Complete range of sensors: heated versions (anemometers, rain gauges), natural and forced ventilated thermometers, complete range of solar radiometers (global and net), atmospheric pressure, etc
- Mechanical and ultrasonic anemometers
- Calibration and maintenance services
- Compact stations with All-in-One sensor and RS485 option
- 4÷20 mA output

LSI LASTEM designs and manufactures the most complete range of meteorological sensors and solutions specifically dedicated to AQM applications. Our extensive range includes: wind speed, wind direction, temperature and relative humidity, radiation (global and net), atmospheric pressure and rain sensors.

All the sensors are designed for easy mounting on a pole or tower and have connectors in order to choose a cable of the proper length to the data acquisition system. Single sensors with 4÷20 mA are proposed for an easy integration. Sensors can used both in fixed or portable AQM stations.

Wind Speed&Direction: cup&vane

Wind carries air contaminants away from their source, causing them to disperse. In general in unstable athmosfere, the higher the wind speed, the more contaminants are dispersed and the lower their concentration.

Wind Speed&Direction: ultrasonic

LSI Lastem provides mechanical and ultrasonic anemometers to be integrated in AQMS. Different models are available (see catalogues MW9000-06/10).

Temperature & Relative Humidity

Air Temperature acts as a catalyst for pollutants. Higher levels of pollutants (0_3, NO_2) are more prevalent in high temperature conditions. Air temperature vertical dynamic has influence on pollutant deposition on the ground. LSI LASTEM supply sensors with high efficency radiation shield even with forced ventialtion option.

Atmospheric Pressure

Pressure also affects weather pollution levels. During high pressure events, the air is stable, which allows pollution levels to build up, but during low pressure the atmosphere is often unstable, causing dispersion.

Global radiation

The atmospheric stability classes are based on surface wind speed, nighttime cloud cover and daytime incoming solar radiation. LSI LASTEM provides global radiometers (Spectrally Flat Class A, B, C) and net radiometers.

Net Radiation

The net radiation is the difference between downward/incoming and upward/outgoing radiation from the ground. This parameter influences the temperature vertical dynamic and then the dispersion of contaminants.

Rain gauge

Monitoring rainfall is really important: rainfall can clean the air, but at the same time, chemicals, inquinants and compounds that pollute the air can fall with rain polluting soil and surface waters.

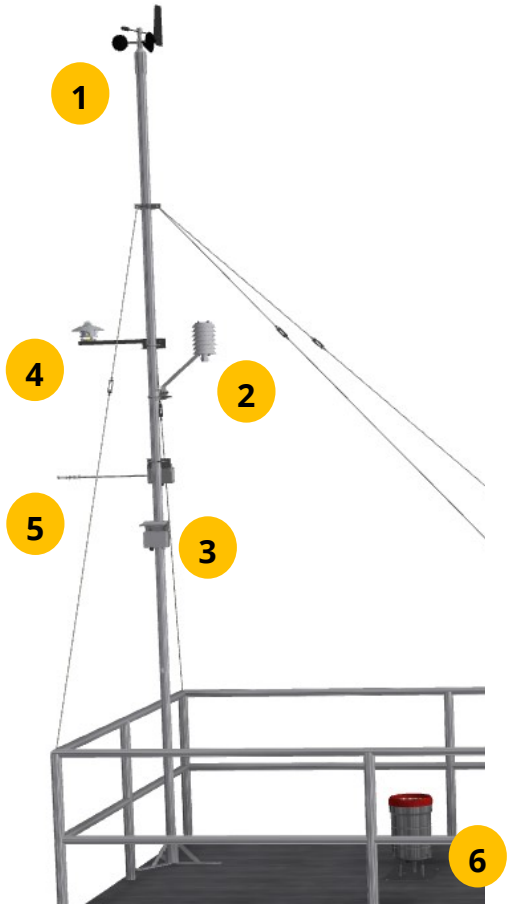
All-In-One sensors

Compact or Standard versions for a small multi-parametric sensor that measures Temperature, Relative Humidity, Pressure, Wind Speed & Direction. RS485 Modbus output is available on this range of sensors

All-In-One with global radiation

All-In-One sensors can also measure global radiation (compact or standard version), this small system can be used to monitor all the relevant parameters for air quality.

4÷20 mA output kit

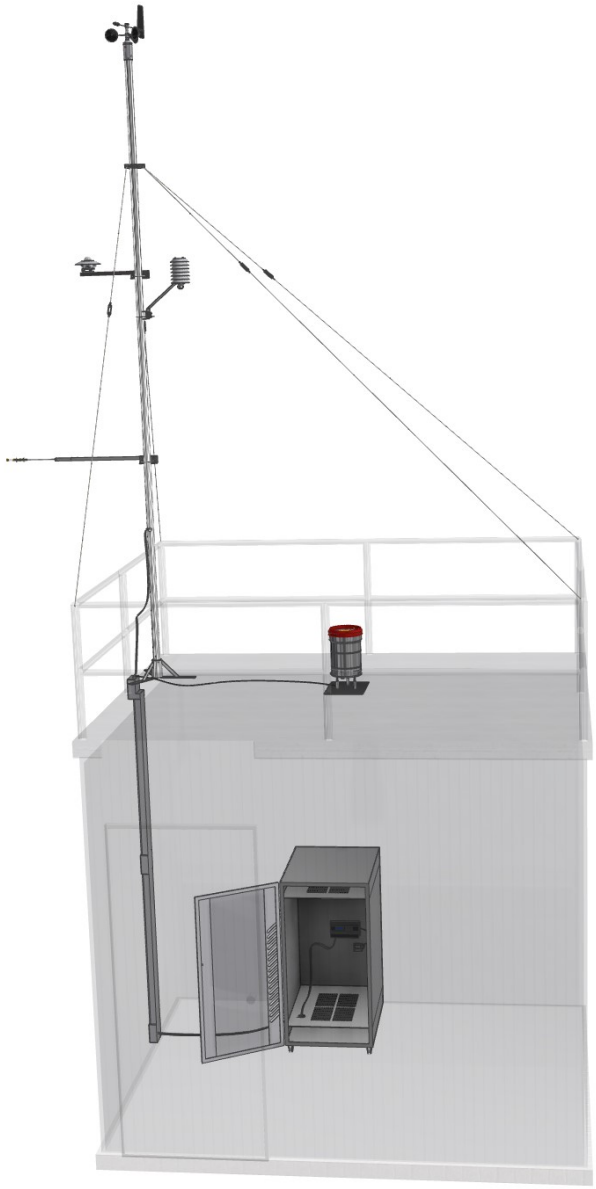


NOTES	
A	LSI LASTEM can supply cables from 5 to 100 m length
B	DMA875 sensor features a radiant screen with natural ventilation
C	DMA867 version with forced ventilation
D	LSI LASTEM can supply cables from 5 to 25 m length
E	ISO9060 Class A and B pyranometers are also available
F	heated models are also available
G	different poles and towers are available

Drw. Ref.	Cod.	Description	Kit	Ref. Note
		Combined Cup&Vane wind sensor (see catalogue MW9000-ENG-06)		
1	**DNA821**	Sensor/cup&vane anem./WS+WD/2x4÷20mA/10÷30V	1	
	DWA525A	Cable/L=25m/sensors	1	A
		Separate Cup and Vane wind sensors (see catalogue MW9000-ENG-09+10)	Altern. to Combined	
	DNA801	Sensor/Cup-anem.-Standard/WS/4÷20mA/10÷ 30V	1	
	DNA810	Sensor/Vane-anem.Standard/WD/4÷20mA/10÷ 30V	1	
	DWA525A	Cable/L=25m/sensors	2	
	DYA046	Arm/Multiple sensors/to D=45÷65mm.pole	1	A
		Sonic wind sensor (see catalogue MW9000-ENG-07)	Altern. to Cup&Vane	
	DNB306	Sensor/Sonic/WS+WD/2x4÷20 mA/10÷30V	1	
	DWA833	Cable/L=25m/DNB20x-30x	1	A
		Temperature and RH% sensor (see catalogue MW9000-ENG-05)		B
2	**DMA875**	Sensor/T+RH%/2x4÷20mA/10÷30V/without rad.screen	1	C
	DMA867	Sensor/T+RH%/2x4÷20mA/10÷30V/without rad.screen, forced ventilation	Altern. to DMA875	D
	DWA510A	Cable/L=10m/sensors	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	

Drw. Ref.	Cod.	Description	Kit	Ref. Note
		Atmospheric Pressure sensor (see catalogue MW9000-ENG-22)		
3	**DQA801**	Sensor/Abs.Pressure/600÷1100hPa/4÷20 mA/9÷30V/IP65	1	
	DWA510A	Cable/L=10m/sensors	1	A
	DYA078	Arm/DQA801/to DYA049	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	
		Radiation sensor. Second class pyranometer (see catalogue MW9000-ENG-11)		E
4	**DPA863**	Sensor/Pyranometer/Second Class/4÷20mA/ 10÷30V	1	
	DYA034	Arm/DPA154-855-870-863-873-252-952-817- 822/Horiz./to DYA049	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	
	DWA410A	Cable/L=10 m/DPA154-855-870-863-873-817-822	1	A
		Net radiometer (see catalogue MW9000-ENG-13)		
5	**DPA840**	Sensor/NET radiat./÷150+1500Wm-2/4÷20mA/ 10÷30V	1	
	DWA510A	Cable/L=10m/sensors	1	A
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	
6		**Rain gauge (Tipping bucket) (see catalogue MW9000-ENG-18)**		F
	DQA230.1	Sensor/Rain gauge/324cmq/Siphon/Hz	1	
	DYA039.1	Ground base/DQA23x/ground installation	1	
	DWA510A	Cable/L=10m/sensors	1	D
	XLA003.1	Rain gauge signal converter/0÷20mm/4÷20 mA/10÷30Vdc/DIN bar	1	
		Pole H.3 m (see catalogue MW9007-ENG-01)		
	DYA010.1	Pole/H=3m/D=50mm	1	G
	DYA020	Tripod/concrete installation/pole D= 50 mm	1	
	DYA020.1	Anchoring bolts for tripod/3 set	1	
	DYA072	Arm/ELFxxx/to wall	1	

Meteorological Station for AQMS

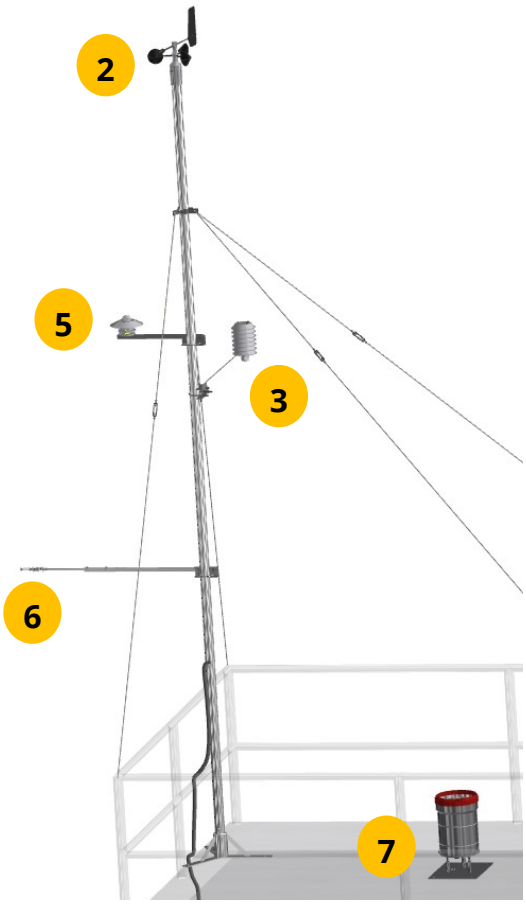


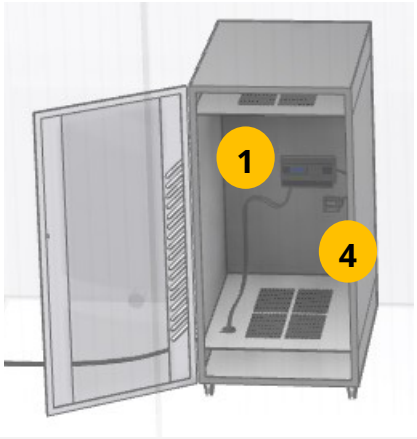
- Complete system with sensors and data logger
- Data logger connected through RS485 to local SCADA by Modbus RTU and simultaneous local data storing and remote communication by modem
- Wind rose on the receiving PC
- Possibility to have some specific calculation on the data logger: Delta Temperature, Wind prevalent sector, etc
- Free inputs on data logger for additional sensors related to the AQMS system

Sensors for Air Quality Monitoring previously proposed as sensors with analogue output (wind speed and direction, temperature, relative humidity, global and net radiation, precipitation and pressure) can be assembled as a complete system with data logger. In this case the sensors selection is different because LSI LASTEM data logger can accept direct output from most of the sensors. Data logger, hosted in the AQMS station shelter, can be connected by Modbus RS485 to the AQMS SCADA. This option gives the great advantage to have a separate system to manage the meteorological measurements, while, anyway, is connected to the local SCADA to push there all the instant values and at the same time, with the possibility to store all the data on a separate system and to send them to a remote PC.

PN	DNA212.1	DNA202.1	DQA240.1	DPA240	DPA053	DMA672.1	DQA230.1
Quantity	Wind Direction	Wind Speed	Absolute Pressure	Net Radiation	Solar Radiation	Temp.+RH%	Rain Gauge
Principle	Encoder	Relay Reed	Piezometric	Thermo-pile	Thermo-pile	• RTD (Pt100 1/3 DIN) (temp) • Capacitive (RH)	Tipping bucket + siphon Diam: 203 mm Area: 323 cmq
Range	0÷360°	0÷75 m/s	800÷1100 hPa	0,3÷50 µm (spectral)	285÷3000 nm (spectral)	• -50÷100°C (temp) • 0÷100% (RH)	
Threshold	0,4 m/s	3%					
Accuracy	3°	0,5 m/s	±0,5 hPa	5% daily	±10%	• 0,1°C (@0°C) (temp) • ±1% (@5÷95%) (RH)	Accum. Rainfall: 0÷20 mm/hr: ± 0,2mm 20÷240 mm/hr: 1% >240 mm/hr: 2%
Cable	5÷50 m	5÷50 m	50 cm	10 m	3 m	3 m	10 m

AQMS meteorological station kit





NOTES	
A	LSI LASTEM can supply cables from 5 to 100 m length
B	LSI LASTEM can also supply a 25 m cable
C	30 cm cable, must be positioned near the data logger inside the shelter
D	ISO9060 Class A and C pyranometers are also available
E	Compact alternative to separate sensors. It can be connected to a data logger or be used alone with RS485 Modbus RTU output to SCA-DA
F	necessary to have RS485 output without data logger, when All-In-One is selected
G	different poles and towers available

Drw. Ref.	Cod.	Description	Kit	Ref. Note
		Data logger		
1	**ELO3305**	E-Log/N.12 inputs/8MB/display	1	
	DEA260.1	IP54 Power unit/230Vac->13.8Vdc/IP54/0,6A/wires	1	
		Communication RS232->485 converter		
	DEA504	RS232->485 converter/DIN bar	1	
		Combined Cup&Vane wind sensors (see catalogue MW9000-ENG-06)		
2	**DNA121**	Sensor/cup&vane anem./WS+WD/Hz+0÷1V/ 10÷30V	1	
	DWA525A	Cable/L=25m/sensors	1	A
		Sonic wind sensor (see catalogue MW9000-ENG-07)	Altern. to Cup&Vane	
	DNB306	Sensor/Sonic/WS+WD/2x4÷20 mA/10÷30V	1	
	DWA833	Cable/L=25m/DNB20x-30x	1	A
3		**Temperature and RH% sensor (see catalogue MW9000-ENG-05)**		
	DMA672.5	Sensor/T+RH%/Pt100+0÷1V/12V/Cable L. 3m+con.DWA9nn	1	
	DWA910	Cable/L=10m/DMA672.5	1	B
	DYA230	Radiant screen/NV/DMA67x-033	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole		
4		**Atmospheric Pressure sensor (see catalogue MW9000-ENG-22)**		
	DQA240.1	Sensor/Abs.Pressure/800÷1100hPa/0÷1V/12V	1	C

Drw. Ref.	Cod.	Description	Kit	Ref. Note
5		**Radiation sensor. First class pyranometer (see catalogue MW9000-ENG-11)**		D
	DPA154A	Sensor/Pyranometer/First Class/µV/Cable L=10 m	1	
	DYA034	Arm/DPA154-855-870-863-873-252-952-817- 822/Horiz./to DYA049	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	
6		**Net radiometer (see catalogue MW9000-ENG-13)**		
	DPA240	Sensor/Net Radiation/µV/Cable L=10 m	1	
	DYA031	Arm/DPA240/to DYA049	1	
	DYA049	Collar/for sensor arm to D=45÷65mm pole	1	
	MDMMA1010.1	MSB/N2 Pt100+mV+Hz/RS485/10÷30V	Optional	F
		All-In-One sensor - Standard version (see catalogue MW9000-ENG-08)	Altern. to separate sensors	E
	DNB302	DNB302Sensor/AIO Standard/WS+WD+T+RH+Press+Rad/ RS485/10÷30V	1	
	DWA832	Cable/L=10m/DNB20x-30x	1	
7		**Rain gauge (Tipping bucket) (see catalogue MW9000-ENG-18)**		
	DQA230.1	Sensor/Rain gauge/324cmq/Siphon/Hz	1	
	DYA039.1	Ground base/DQA23x/ground installation	1	
	DWA510A	Cable/L=10m/sensors	1	B
	XLA003.2	Rain gauge signal converter/0÷20mm/RS485/10÷30Vdc/DIN bar	Optional	F
		Pole H.3 m (see catalogue MW9007-ENG-01)		
	DYA010.1	Pole/H=3m/D=50mm	1	G
	DYA020	Tripod/concrete installation/pole D= 50 mm	1	
	DYA020.1	Anchoring bolts for tripod/3 set	1	
	DYA028	Tie rods/H=2-3m	1	
	DYA026	Ground picket/L=1m/3set	1	

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