LSI LASTEM S.r.l.
Via Ex S.P. 161 Dosso, n.9 - 20090 Settala Premenugo (MI) - Italia

Tel.: (+39) 02 95 41 41
Fax: (+39) 02 95 77 05 94
e-mail: info@lsi-lastem.it

WEB: http://www.lsi-lastem.it
CF./P. Iva: (VAT) IT-04407090150
REA: 1009921 **Reg.Imprese:** 04407090150

Thermo-hygrometer with current outputs cod. DMA867 and DMA875

User manual

Index

1 Introduction

Thermohygrometers DMA867 and DMA875 are instruments to measure environmental temperature, relative humidity and dew point. The determination of dew point takes place according to the formulations specified by ISO 7726.

The measuring element is housed inside a radiation shield, available with both natural (DMA875) and forced (DMA867) ventilation, to achieve measuring conditions equivalent to a Stevenson shelter.

1.1 Notes about this manual

Document: INSTUM_01378_en - Update on 9 Mar. 2015.

2 Product installation

2.1 General safety rules

Please read the following general safety rules in order to avoid injuries to people and prevent damages to the product or to possible other products connected with it. In order to avoid any damages, use this product exclusively according to the instructions herein contained.

The installation and maintenance procedures must be carried-out only by authorized and skilled service personnel.

Power the instrument in a suitable manner. Pay attention and observe the power supplies like indicated for the model in your possession.

Carry-out all connections in a suitable manner. Pay strict attention to the connection diagrams supplied with the instrument.

Do not use the product in case of suspected malfunctions. In case of suspected malfunction, do not power the instrument and contact authorized technical support immediately.

Do not set working the product in an explosive atmosphere.

Before you carry-out any operation on electrical connections, power supply system, sensors and communication apparatus:

- Disconnect the power supply.
- Discharge the accumulated electrostatic discharges touching an earthed conductor or apparatus.

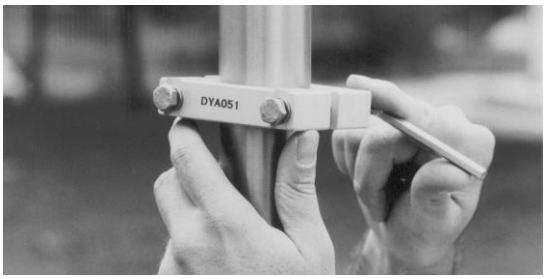
2.2 How to choose the survey site

Select a site with conditions representative of the environment being examined. Thermo-hygrometers must be assembled in sites where the morphological conditions of the earth, the urban structures and the environmental conditions in general make them particularly representative of the general conditions in which the measurement is to be performed.

It is important that there are no structures in the nearby areas which might radiate heat, such as cement floors, asphalt, walls, etc. The thermo-hygrometers should be installed at 1.5 - 2 m from the

2.3 Mechanical mounting

Fit the DYA049 or DYA051 supporting collar to the pole at the desired height, usually at 1,5 - 2 m, and tighten the screws using an allen key n. 6.



Fix the sensor to the supporting collar by tightening the two bolts indicated with arrows in the picture. Connect the DWA cable to the sensor and to the data acquisition system according to drawing DISACC5901d.
when a forced ventilation radiation shield is in use, feed the fan engine with a suitable power supply.

2.4 Dip-switches configuration

The factory settings are:

- Electric output: *4÷20 mA*
- Hygrometric output: *UR %*
- Temperature range: *-30÷70 °C*

To change the settings open the sensor box , set the dip-switches according to your needs (the arrangement of the dip-switches is shown inside the box cover and on the drawing DISACC5901d) and close the box.

2.5 Electrical connection

Power the instrument according to the technical specifications. For optimal operation, ensure proper earthling of the power and communication lines.

3 Application note

3.1 Measuring humidity in high temperature environments

In very wet tropical areas, humidity values may acquire a very low dynamic range, close to saturation conditions and, at the same time, to have a low temperature dynamic range and very low wind speed values. In certain periods of the year, these conditions may occur even in milder areas for short periods of time.

In such conditions, the hygrocapacitive element can get wet (from dew) and have no time to get dry and restore its measuring capacity. In this case, even if the humidity value decreases, the humidity measurement stabilizes to the saturation value or is – at any rate – underestimated.

Two conditions may occur. The first one refers to every category of "exchange type" humidity sensor; the second one is typical of capacity-measurement humidity sensors:

a) The layer of dew over the measuring element can reach 0,25 mm. Penman's theory states that 8 hours are needed for the layer of dew to evaporate (30°C, 80 RH% with no air speed), or 4 hours (30°C, 60 RH% with no air speed). These time periods can be shorter in case of forced ventilation (not less than 1.5 m/s).

b) The manufacturers of hygrocapacitive elements inform that a persistent humidity level on the element could produce a secondary absorption phenomenon, as well as cause a temporary shift of the humidity measurement equal to about +6%. This error disappears when the element is exposed for some hours to lower humidity values.

These considerations confirm that the hygrocapacitive element can be used when humidity values reach a sufficient dynamic range to enable the sensor adjustment based on the "stress" condition.

4 Diagnostics

4.1 External visual check

1. Check that the external anti-radiant shield is clean and with no dents (a suitably clean shield will have a higher reflecting capacity).
2. Check for the fan (in the forced ventilation models) proper operation.

4.2 Internal visual check

Draw out the sensor from the shield and:

1. Check that the porous filter protecting the sensitive element is properly clean (see *§5.2*).
2. Check that the hygrocapacitive element is properly clean. Check for any presence of dust or dew on the capacitive plate (if possible also with the help of a magnifying lens). Check as well that contacts are free from oxidations. Do not touch the capacitive plate with your hands. If necessary, clean the element (see *§5.2*).

5 Maintenance

This sensor is a precision measurement apparatus. In order to maintain the specified measurement precision over the time, LSI LASTEM recommends check it periodically (at least twice a year); it is moreover suggested the replacement of the measure element according to the place of installation (in persistent conditions of high humidity, pollution, dust and chemical substances presence, the sensitive element deteriorate faster than the one placed in a location with less adverse conditions). It is, anyway, a good rule to replace the sensitive element at least once every two years.

Please, remind that the sensitive element ML3015, when used, is no under guarantee.

5.1 Cleaning the antiradiant shield

Clean the external anti-radiant shield with the aid of a small brush or a wet rag.

5.2 Cleaning the measuring elements and the porous filter

1. Disconnect the cable from the probe;
2. Unscrew the cable seals at the bottom and pull out the sensor from the shield;
3. Unscrew the filter;
4. Clean the filter with a cold air jet.

6 Accessories / Spare parts

Code	*Description*
DYA049	Mast-mounting device for Ø45÷65 mm pipe
DWA510	Cable L = 10 m
DWA525	Cable L = 25 m
DWA526	Cable L = 50 m
DWA527	Cable L = 100 m
ML3015	Sensitive element (spare part)
MM0315	Fan for forced ventilation shield DYA231 (12 Vdc)
MM0316	Fan for forced ventilation shield DYA232 (24 Vac)
DZC301.S	Calibration certificate
MG2251	7 pin free female connector.

7 Disposal

This product is a device with high electronic content. In accordance with the standards of environmental protection and collection, LSI LASTEM recommends to handle this product as waste of electrical and electronic equipment (RAEE). For this reason, at the end of its life, the instrument must be kept apart from other wastes.

LSI LASTEM is liable for the compliance of the production, sales and disposal lines of this product, safeguarding the rights of the consumer. Unauthorized disposal of this product will be punished by the law.

8 How to contact LSI LASTEM

In case of problem contact the technical support of LSI LASTEM sending an e-mail to support@lsi-lastem.it, or compiling the technical support request module at www.lsi-lastem.it.

For further information, refer to addresses and numbers below:

- Phone number: +39 02 95.414.1 (exchange)
- Address: via ex S.P. 161 – Dosso n. 9 - 20090 Settala Premenugo, Milano
- Web site: www.lsi-lastem.it
- Commercial service: info@lsi-lastem.it
- After-sales service: support@lsi-lastem.it, riparazioni@lsi-lastem.it

9 Specifications

9.1 Models

Order numb.	DMA867	DMA875
		

9.2 Measuring specifications

- Measures:
  - Ambient temperature [°C]
  - Ambient relative humidity [%]
  - Ambient dew point [°C]
- Ambient temperature section:
  - Principle: Pt100 thermoresistance
  - Range: selectable from
    - Variant .1:
      - -30 ÷ 70 °C
      - -50 ÷ 100 °C
      - -50 ÷ 50 °C
      - 0 ÷ 100 °C
    - Variant .2:
      - -40 ÷ 60 °C
      - -50 ÷ 60 °C
      - -50 ÷ 70 °C
      - -30 ÷ 100 °C
  - Accuracy: ±0.2 K @ 23 °C
  - Resolution 0.04 °C
  - Responce time: 3' (T90)
- Humidity section:
  - Principle: hygro-capacitive
  - Range: 0 ÷ 100 %rh
  - Accuracy ±1.5 %rh @ 23 °C
  - Resolution 0.1 %rh
  - Responce time: 10' (T90)
- Dew point section:
  - Measurement calculated conforming to ISO 7726 formulas
- Other characteristics:
  - Forced ventilation (only DMA867)

9.3 Signal outputs specifications

- Available outputs: 2
- Output signal: current with 0 ÷ 20 or 4 ÷ 20 mA scale, selectable
- Output measure selection: between RH and dew point; temperature scale
- Maximum output load: 500 Ω V. power 24 V; 300 Ω V. power 12 V

9.4 Electrical specifications

- Power supply: 10 ÷ 30 Vdc/Vac
- Power consumption: 3 W
- Protections:
  - Reversal power polarity
  - Electrical discharge on power and sensor input. Max dissipable power: 600 W (10/1000 µs)
- Connections:
  - IP65 7 pin connector for:
    - Power line
    - Signal outputs
  - Ambient probe:
    - Line cable to terminal block on the board: 4 poles
    - Cable: type PUR (polyurethane)
  - Fan:
    - Line cable to terminal block on the board: 2 poles

9.5 Mechanical specifications

- Environmental protection class: IP65
- Operating conditions:
  - Temperature range: -40 ÷ 80 °C
  - Umidity range: 0 ÷ 100 %rh
- Storage conditions:
  - Temperature range: -40 ÷ 80 °C
  - Umidity range: 0 ÷ 100 %rh
- Mounting: on wall/on pole

9.6 General specifications

- EMC compliant: report 2014/05/28, doc. TR_01438_en

10 CE conformity declaration

Product description: Thermo-hygrometer sensor with current outputs**.**

Models: DMA867

Issuer: LSI LASTEM Srl

LSI Lastem Srl declare under sole responsibility the above products are made under European directives 2004/108/EC and, specifically to the electromagnetic conformity, with the relevant provision of the following harmonized standards:

- EN 61326-1 (2006): Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 1: General requirements.
- EN 61000-3-2 (2006): Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
- EN 61000-3-3 (2008): Electromagnetic compatibility (EMC) -- Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

The main standard(s) above contains references to other standards, which are listed below.

- EN 55011 (2009) + A1 (2010): Limits and methods of measurement of radio interference characteristics of industrial, scientific and medical (ISM) devices.
- EN 61000-3-2 (2006): Electromagnetic compatibility (EMC) — Part 3-2: Limits — Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
- EN 61000-3-3 (1995) + A1 (2001): Electromagnetic compatibility (EMC) -- Part 3-3: Limits — Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
- EN 61000-4-2 (1995) + A1 (1998) + A2 (2001): Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.
- EN 61000-4-3 (2002): Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
- EN 61000-4-4 (2004): Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test.
- EN 61000-4-5 (1995) + A1 (2001): Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test.
- EN 61000-4-6 (2003): Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields.
- EN 61000-4-8 (1993) + A1 (2001): Electromagnetic compatibility (EMC) -- Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test.
- EN 61000-4-11 (2004): Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.

Settala, May 28, 2014 Luca Lesi