Wind speed sensors

User's manual

Updated 29/08/2023

Index

1 Description

1.1 Main features

The tacho-anemometer is a sensor for measuring wind speed. The tachymetric system consists of a 32 notch rotating disc with optoelectronic reading. The electrical signal is made up of a series of pulses with frequencies that are proportional to the speed of the rotor mounted on the sensor transducer. In the heated versions, a thermostat controls a heater that keeps the rotor moving effectively in case of freezing.

The sensor range includes versions with "normalized" output (4÷20 mA, 0÷20 mA, 0÷5 Vdc) and with direct output (Hz). Sensor with direct output can be connected to LSI LASTEM acquisition systems, or any other device using such kind of input.

The sensor is made up by the transducer and rotor. Connection cable should be included in the supply (see §5).

1.2 Models and technical specifications

1.2.1 Standard sensor

Order numb.	**DNA301.1**	**DNA302.1**
Measuring range	0÷75 m/s	
Output	0÷883 Hz	
Power supply	10÷30 Vac/dc	-
Heater (power supply)	NO	YES (24 Vac)
Heater operative temperature	-	-20÷4 °C
Power consumption	20 mA	20 W (heater)
Data logger compatibility	M-Log (ELO008), R-Log (ELR515), E-Log, A-Log (with ALIEM)	

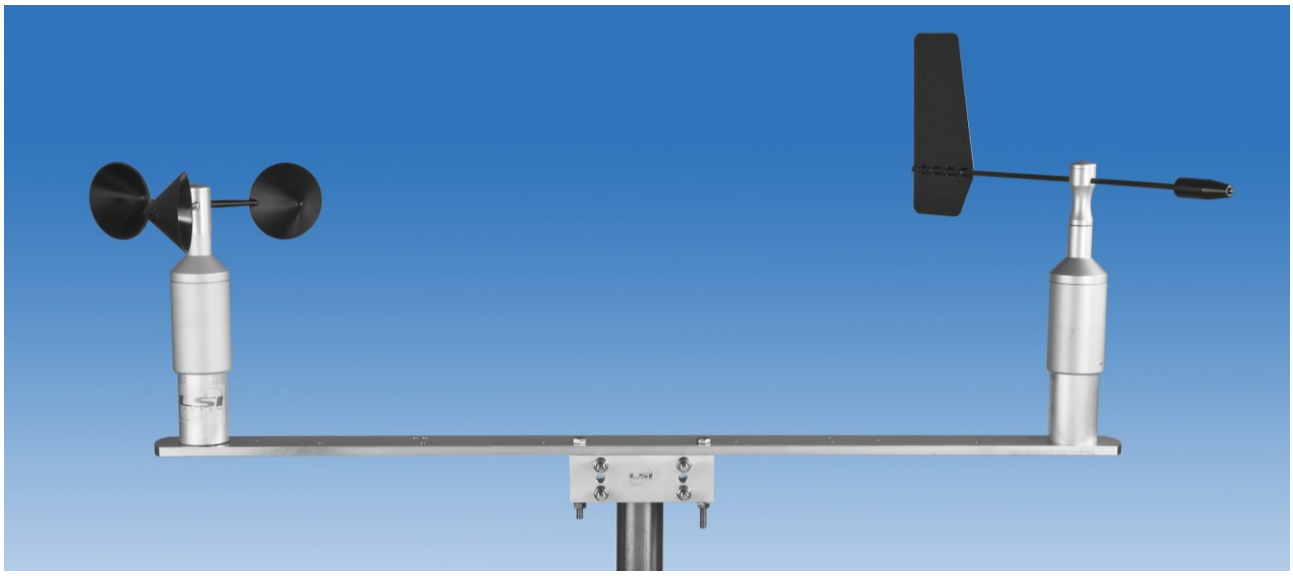
Order numb.	**DNA801/801.1**	**DNA802**	**DNA805**	**DNA806**	**DNA807**
Measuring range	0÷50 m/s (0÷60 m/s DNA801.1)				
Output	4÷20 mA		0÷20 mA		0÷5 Vdc
Power supply	10÷30 Vac/dc	-	10÷30 Vac/dc	-	10÷30 Vac/dc
Heater (power supply)	NO	YES (24 Vac)	NO	YES (24 Vac/dc)	NO
Heater operative temp.	-	-20÷4 °C	-	-20÷4 °C	-
Power consumption	0.5 W	0.5 W + 20 W (heater)	0.5 W	0.5 W + 20 W (heater)	0,5 W
Data logger compatibility	M-Log (ELO008), R-Log (ELR515), E-Log, A-Log				

Common features		
Wind speed	Principle	Optoelectronic with 32 step disk
	Accuracy	0.25 m/s or 3% (0÷25 m/s), 2% (> 25 m/s)
	Threshold	0.26 m/s
	Resolution	0.06 m/s
	Delay distance	4.8 m (@ 10 m/s). According to VDI3786 and ASTM 5096-96
General	Damage limit	75 m/s
	Connector	7 pin IP65 watertight connector
	Housing	Anodized aluminum
	EMC	EN 6132-1 2013
	Protection	IP66
	Operative temperature	-35÷70 °C (without ice)
	Mounting	Mast ø 48 ÷ 50 mm

1.2.2 Compact sensor

DNA202.1		
Wind speed	Principle	Relay Reed
	Measuring range	0÷75 m/s (damage limit)
	Accuracy	± 0.5 m/s (0÷10 m/s), 2.5% (>10 m/s) ± 0.1 m/s or ±1% (using transfer formula)
	Threshold	0.5 m/s
General	Output	N. 6 pulses/round, 2.6÷2.8 Hz x m/s
	Max. load	5 mA@12 Vdc
	Connector	7 pin IP65 watertight connector (not included, see Accessories)
	Cable	Compatibility with DWA5xx cable (not included, see Accessories)
	Housing	Anodized aluminum
	Operative temperature	-35÷70 °C (without ice)
	Protection	IP66
	Mounting	Mast ø 48÷50 mm
	Data logger compatibility	M-Log (ELO008), R-Log (ELR515), E-Log, A-Log (with ALIEM module)

2 Assembly instructions



The tacho-anemometer can be assembled either alone or coupled with the gonio-anemometer by mean of the DYA046 coupling bar.

Select a well-exposed spot for the instrument. The WMO (World Meteorological Organization) suggests that the instrument should be assembled 10 m off the ground; in a place where the distance between the sensor and surrounding obstacles which might disturb the measurements is at least 10 times the height of those objects from the ground. As such a position is difficult to find, the WMO suggests that the instrument should be assembled in a spot which is reasonably uninfluenced by local obstructions.

2.1 Mounting standard sensor (DNA80x, DNA30x)

Unscrew the nut and washer from the shaft thread.

Mount the DNA204 wind rotor on the sensor's body. Keep the shank in a steady position and insert the rotor until it goes to the nut adjustment.

Tighten the screw of the rotor (indicated by the arrow) and the cover. Attention: don't leave the sensor in outdoor operation without its rotor.

Connect the cable to the sensor.

Mount the sensor on the mast and tighten the screw (indicated by the arrow).

See Part 3. Connections

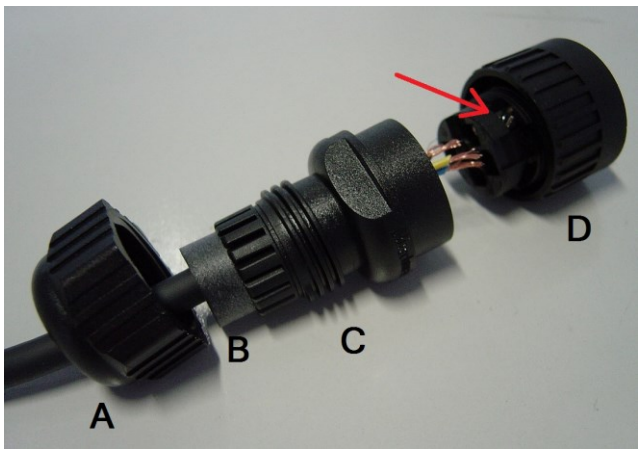
2.2 Mounting compact sensor (DNA202.1)

Unscrew the screw from the shaft thread.

Mount the DNA207 rotor on the sensor's body.

Tighten the screw of the rotor. Attention: don't leave the sensor in outdoor operation without its rotor.

Connect the DWA5xx cable to the sensor. If you do not have the DWA5xx cable but the MG2251 connector, build the cable as indicated below.



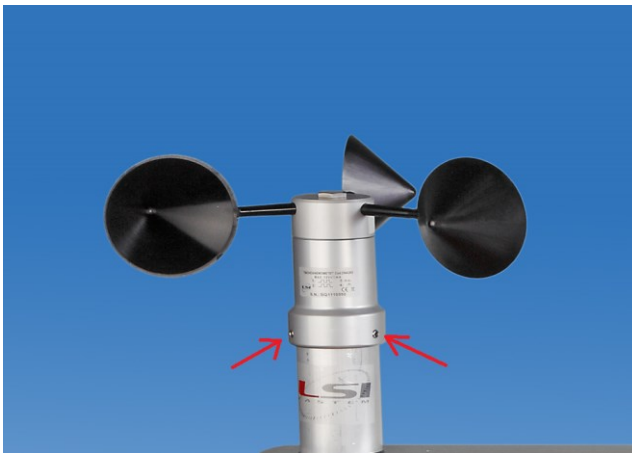
Open the MG2251 free connector. Pass the cable as in the picture above, select the rubber ring B (ø 6 or 9 according to the cable dimension).

Pin	
2	SEGNALE IMPULSIVO/Pulse Signal
3	SEGNALE IMPULSIVO/Pulse Signal
1	N.C.
4	N.C.
6	N.C.
7	N.C.
5	Contenitore/Armature

Fix the cable (n.3 wires) on the connector D: screw each wire (indicated by the arrow) on the correspondent connector pin as in the above drawing.

Attention to the colour of the wires when connecting the sensor to the data logger.

If instead the DNA202.1 sensor replaces the DNA202 sensor, connect the existing cable to the new sensor using the CCDCA0003 adapter.



Finally, mount the sensor on the mast and tighten the screws (indicated by the arrows).

3 Connections and transfer formula

For the wiring connection, read the following drawings:

DNA202.1	DISACC 200013
DNA301.1	DISACC 190005
DNA302.1	DISACC 07034
DNA801	DISACC 200048
DNA801.1	DISACC 200046
DNA805	DISACC 200037
DNA806	DISACC 200038

Cable DWA5xx	DISACC 3217

Transfer Function Table for DNA202 sensor	
Speed (m/s)	**Frequency (Hz)**
1.002	2.13
5.077	12.23
10.150	25.1
15.172	37.25
20.194	50.07
25.216	63.27
30.310	75.4
40.503	102
45.599	115
50.576	126.3
60.530	152.2

Transfer Function Table for DNA30x sensors	
Speed (m/s)	**Frequency (Hz)**
1.02	12.08
5.07	69.00
10.15	141.00
25.15	353.50
45.52	638.80
58.46	828.80

4 Maintenance

4.1 Testing

This type of testing is only required if the user wishes to verify the well functioning of each part of the instrument. Please note that these tests are not intended to establish the operational limitations of the instruments.

Visual check

- body of the sensor is in a level position.
- Rotor is not broken or deformed.

Mechanical check

Having removed the rotor, check that the conical pin (Compact version) or the shaft thread (Standard version) on which the rotor rotates moves freely and perfectly smoothly. If not bearings replacement is needed.

Output operational check (only for instruments with analogue output)

Connect the system (power on the power supply) to the signal output reader and measure the wind speed with the following results:

Sensor output	Speed (m/s)	N. rounds/s	Output
4÷20 mA	2.37	1	4.76 mA
0÷20 mA	2.37	1	0.95 mA
0÷5 Vcc	2.37	1	237 mV

Heater check (for heated sensor only):

- Remove the cup from the body of the sensor;
- Leave the sensor in a freezer for 3/4 hours at a temperature below 2 °C;
- Connect a multimeter to the ends of cables 6-Red 5-White for DNA302 or 1-Brown 6-White for others;
- Under these conditions, the resistance recorded should be approx. 40 Ω.

4.2 Periodic maintenance

- Clean the sensor, attention to the space between the transducer and the cup.

LSI LASTEM suggests to check the instrument calibration at least every 2 years.

5 Accessories / Spare parts

5.1 Sensore DNA202.1

Codice	Descrizione
DYA046	Coupling bar for WS+WD sensors on ø 45 ÷65 mm pole
DWA505	Cable L = 5 m
DWA510	Cable L = 10 m
DWA525	Cable L = 25 m
DWA526	Cable L = 50 m
MG2251	Free female 7 pin watertight connector
DNA207	Spare part: vane
MM2001	Spare part: bearing
SVICA2203	Calibration certificate according to ISO9000 (wind speed)
SVACA2216	Calibration certificate according to ISO17025-ACCREDIA (wind speed)
DEA420.1	STB – Signal Transducer Box (Output: 4÷20 mA, Power supply: 10÷30 Vac/dc)
MDMMA1010.1	MSB – Modbus Sensor Box (Output RS-485 Modbus-RTU, Power supply: 10÷30 Vac/dc)
CCDCA0502	Cable L = 5 m with connectors for interconnection between Head Shield Master unit and DNA202.1 anemometer
CCDCA0003	Adapter to connect the DNA202's cable to the DNA202.1 sensor

5.2 Sensori DNA30x.1, DNA80x

Codice	Descrizione
DYA046	Coupling bar for WS+WD sensors on ø 45 ÷65 mm pole
DWA505	Cable L = 5 m
DWA510	Cable L = 10 m
DWA525	Cable L = 25 m
DWA526	Cable L = 50 m
DWA527	Cable L = 100 m
MG2251	Free female 7 pin watertight connector
DNA204	Spare part: vane
MM2025	Spare part: bearing
SVICA2203	Calibration certificate according to ISO9000 (wind speed)
SVACA2216	Calibration certificate according to ISO17025-ACCREDIA (wind speed)

6 Declarations of conformity

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DICHIARAZIONE DI CONFORMITA' CE

CE Conformity Declaration

Produttore: **LSI LASTEM s.r.l.**
Applicant Via Ex S.P. 161 Dosso, n.9 – 20090 Settala Premenugo (MI) – Italia

Con la presente si dichiara che tutti i prodotti delle seguenti serie:
We hereby declare that all the products of the following series:

Velocità e direzione del vento per applicazioni ambientali
Speed and Direction wind for environmental applications

- **DNA701-DNA702-DNA705-DNA706-DNA707-DNA708-DNA709-DNA710-DNA711-DNA714-DNA715-DNA716-DNA717-DNA719-DNA721-DNA722-DNA727-DNA728**
- **DNA801-DNA802-DNA805-DNA806-DNA807-DNA810-DNA811-DNA814-DNA815-DNA816-DNA821-DNA827**

a cui questa dichiarazione si riferisce, è conforme ai requisiti essenziali dei seguenti standard e documenti normativi:
to which this declaration relates, is in conformity with the relevant provisions of the following standard and other normative documents:

EN – 61326 2006 Industrial Location

che rispettano le direttive:
following the provisions of the Directive:

89/336/EEC, 2004/108/CE

La presente dichiarazione copre tutti i modelli derivanti dai prodotti sopra citati.
The present declaration covers all the options derived by the specified product.

Settala, aprile 2012

Dr. Giulio Certo
Direttore Generale e Legale Rappresentante

CE_00166_it+en_1

Esperti delle misure tecnologiche ambientali

Dichiarazione di conformità / *Declaration of conformity*

Oggetto / *Subject*
Codice prodotto / Product code: DNA202.1

Descrizione / *Description*
Sensore Anemometrico velocità vento compatto / Compact anemometer Speed direction sensor

Fabbricante / *Manufacturer*
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Dichiarazione / *Declaration*
Dichiariamo che i prodotti oggetto di questo documento sono stati progettati in accordo e compatibilmente alle seguenti Direttive Europee e norme armonizzate / *We declare that the products covered by this document have been designed in compliance with the following European Directives and harmonized standards:*

2014/30/EU – Direttiva sulla compatibilità elettromagnetica EMC / *EMC electromagnetic compatibility directive.*

EN 61000-6-1: 2007, EN 61000-6-2: 2005– Norme generiche relative all'immunità elettromagnetica riferita ad ambienti residenziali ed industriali / Generic standards for electromagnetic immunity in residential and industrial environments.

EN 61000-6-3: 2007+A1:2011+AC:2012, EN 61000-6-4: 2007+A1:2011 – Norme generiche relative alle emissioni elettromagnetiche riferita ad ambienti residenziali ed industriali / Generic standards for electromagnetic emissions in residential and industrial environments.

2011/65/EU – Direttiva sulla restrizione dell'uso di determinate sostanze pericolose nelle apparecchiature elettriche ed elettroniche. (I nostri prodotti non contengono sostanze definite altamente preoccupanti come definito nell'Art. 33) / *The Restriction of Hazardous Substances Directive. (Our products don't contain the "substances" & "preparations" (Article 33) or release any substances.*

EN 61326-1:2013 – Apparecchi elettrici di misura, controllo e laboratorio – Prescrizioni di compatibilità elettromagnetica – Parte 1: Prescrizioni generali / *Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements*

Il Legale Rappresentante / *Legal Representative*
Andrea Certo

15/01/2021

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