9 NMEA MODE

NMEA protocol, mainly used in the nautical field and in satellite-based navigation systems, specifies that only one of the devices connected can send data, while the others can only act as recipients.

In NMEA mode, the instrument sends automatically the acquired measurements at regular intervals. The interval is factory-set to 1 second and can be configured within 1 and 255 seconds. To change the interval you should access the configuration mode and send **CU4Rnnn** command, where nnn indicates the interval value in seconds (see chapter 6 "*CONFIGURATION"* for details regarding the setting of operation parameters).

This mode is available with RS232, RS485 and RS422 serial connections. Communication parameters should be set in the PC or data logger as follows:

- Baud rate: same as the setting in the instrument (default = 4800)
- Data bits: 8
- Parity: same as the setting in the instrument (default = None)
- Stop bits: same as the setting in the instrument (default = 1)

The instrument is compatible with NMEA 0183 V4.00 protocol.

The protocol establishes that data are sent in the following format:

$$\text{\$<Prefix>,<Data>*<hh><CR><LF>}$$

with   <Prefix> = field consisting in 5 alphanumeric characters: the first two indicate the type of transmitting device, the other three indicate the type of transmitted data
   <Data> = values measured by the instrument, separated by commas
   <hh> = checksum, consisting in two hexadecimal characters
   <CR> = character ASCII *Carriage Return*
   <LF> = character ASCII *Line Feed*

The checksum is calculated by performing the exclusive OR of all characters ranging within **$** and ***** symbols. The 4 most significant bits and the 4 less significant bits of the result are converted in hexadecimal. The hexadecimal value corresponding to the most significant bits is transmitted as the first.
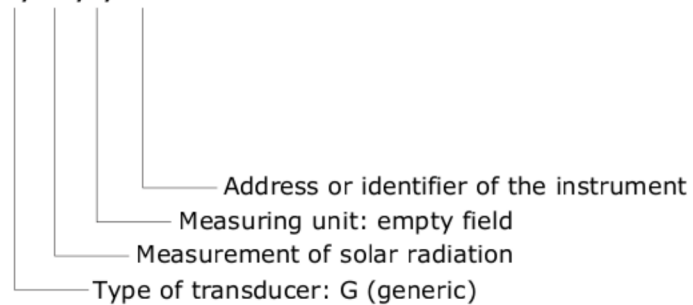
The instrument regularly sends a string in the following general format requested by the protocol:

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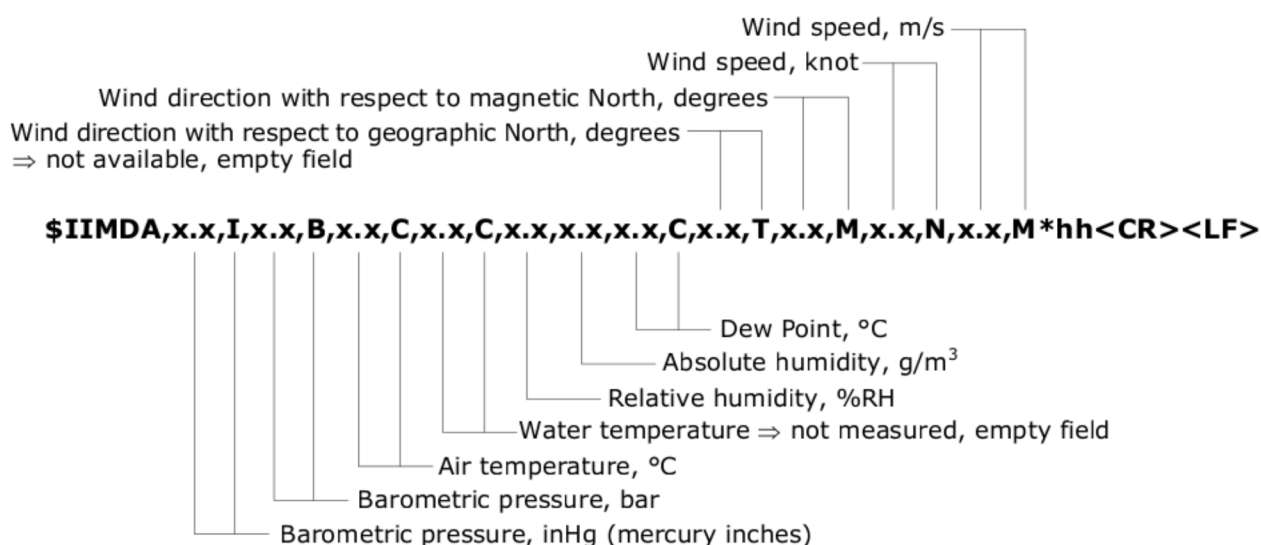
If the instrument model is not equipped to measure some of the quantities indicated in the general format, the relevant fields will be empty and multiple consecutive commas will appear to indicate the missing fields.

The previous string doesn't include the measurement of solar radiation. Models equipped with a pyranometer provide to send the measurement with a second string continuously alternating to the former:

$IIXDR,a,x.x,a,c--c*hh<CR><LF>

- Address or identifier of the instrument
- Measuring unit: empty field
- Measurement of solar radiation
- Type of transducer: G (generic)

EXAMPLE

Suppose that there are the following environmental conditions:

- Wind speed = 5.60 m/s (=10.88 knot)
- Wind direction with respect to magnetic North = 38.7°
- Barometric pressure = 1014.9 hPa (= 30.0 inHg)
- Relative humidity = 64.2 %
- Air temperature = 26.8 °C
- Solar radiation = 846 W/m^2

Based on the above values, the following can be calculated:

- Absolute humidity = 16.4 g/m^3
- Dew Point = 19.5 °C

The strings sent by the instrument in three different cases are indicated below:

• Case 1 – instrument measuring only wind speed and direction:

$IIMDA,,I,,B,,C,,C,,,,C,,T,38.7,M,10.88,N,5.60,M*26<CR><LF>

• Case 2 - instrument measuring wind speed and direction, temperature, relative humidity and barometric pressure:

$IIMDA,30.0,I,1.0149,B,26.8,C,,C,64.2,16.4,19.5,C,,T,38.7,M,10.88,N,5.60,M*2A<CR><LF>

• Case 3 - instrument measuring wind speed and direction, solar radiation, temperature, relative humidity and barometric pressure:

$IIMDA,30.0,I,1.0149,B,26.8,C,,C,64.2,16.4,19.5,C,,T,38.7,M,10.88,N,5.60,M*2A<CR><LF>

alternated to:

$IIXDR,G,846,,01*32<CR><LF>

For additional information regarding the protocol, visit the site "www.nmea.org".