

Memorandum of Information (first round)

For the public European tender procedure New generation wind sensore and 3rd line maintenance - 3D sonic heated wind sensors (TN-463889)

Tenderer is asked to submit questions with the use of this question form.

Instruction of use:

Column A states the question number.

Column B states the document that the question regards, and if possible, please also state the paragraph.

Column C states the question.

Question number	Document	Question	Answers
	Descriptive Document	The deadline for questions via www.tenderned.nl (second round) will be on Thursday October 31st, 2024 (14:00) instead of Wednesday October 30th, 2024 (14:00). Please also refer to the revised Descriptive Document version 1.1.	
1	Annex 01 / 1.1 / 1	Wouldn't it be useful to output both? The scalar and the vector average to comply with some standards (DIN and ISO)?	No, outputting both does not have added value to the use case of KNMI.
2	Annex 01 / 1.1 / 2	Will the substantiation of additional capabilities be kept confidential?	Yes, please refer to section 4.8 of the Descriptive Document, which states, among other things, that ' [...] the Contracting Authority will treat your Tender confidentially, unless the information must be disclosed pursuant to a statutory obligation.'
3	Annex 01 / 1.1 / 4	What is the reason for the very non-linear ranking of high sampling rates, as any sampling rate >10 Hz does not contribute to the quality of data, just to increase the s/n?	High sampling frequencies provide more possibilities for measurement of highly transient events and turbulence related quantities (among others see the 200 Hz samples used for the Energy Dissipation Rate on page 352 of Munoz-Esparza et al (2018), DOI: 10.1175/MWR-D-17-0186.1). KNMI intends to use these sensors for a long time, and wishes them to be capable for many future developments. Also, most 3D sonic anemometers are capable of high sampling rates before the time between samples becomes shorter than the time it takes for sound to cross between the transducers.
4	Annex 01 / 1.2 / 5	Does "all wind directions" include non-horizontal wind flow?	No, only horizontal wind needs to be considered for this mandatory requirement.

5	Annex 01 / 1.2 / 6	Absolute bias is the maximum deviation when the sensor is rotated 360° in wind direction bins $\leq 5^\circ$?	Yes, if you mean the maximum absolute bias when "absolute bias" is used in the question. The absolute bias is the difference (negative differences made positive so that all differences are positive) between the true wind direction (determined by the sensor orientation with reference to the wind tunnel flow) and the reported wind direction of the sensor. The absolute biases may be averaged over wind direction bins $\leq 5^\circ$ and the maximum absolute bias is the maximum of these averages.
6	Annex 01 / 1.3 / 16	What is the reason for the gap between wind speed range 1-10 m/s (4 %) and 10-65 m/s (7%)?	The gap is a consequence of limiting the number of speed ranges to 2 and this was done to keep the requirements from becoming overly complicated. If 3 speed ranges are used there would be no gaps. The most important range is the 1-10 m/s range because these wind speeds occur much more often than higher speeds. So, the 2 ranges above 10 m/s were combined.
7	Annex 01 / 1.3 / 25	The threshold of reporting wind speed (0.01 m/s) is understood as the minimum physical wind flow which can be measured by the sonic. How does that comply with the accuracy requirement for the wind speed?	The accuracy requirement is indeed coarser than the threshold, but the sensor must report something even in this very low wind flow situation. 0.01 m/s is the threshold for reporting wind speed in the specifications of most 3D sonic anemometers but the uncertainty of most wind tunnels is much larger than 0.01 m/s, so requiring an accuracy for a speed of 0.01 m/s is difficult to substantiate.
8	Annex 01 / 1.3 / 28	What is the meteorological situation with such a vertical wind (+-50 m/s)?	Vertical winds of up to 50 m/s occur in Europe during downdrafts caused by extreme thunderstorms.
9	Annex 01 / 1.3 / 30	What is the reason for the gap between the wind speed range 1-10 m/s (up to 4%) and 10-90 m/s (8%)?	See the answer to question #6.
10	Annex 01 / 1.3 / 32	The threshold of reporting wind speed (0.01 m/s) is understood as the minimum physical wind flow which can be measured by the sonic. How does that comply with the accuracy requirement for the wind	See the answer to question #7.
11	Annex 01 / 1.4 / 37	What method is intended to be used to calculate Obukhov length from temperature variance?	It is actually the covariance of the temperature and the vertical wind speed (and not the variance of the temperature itself) that is required to calculate the Obukhov length (L) with this formula: $L = U.U.U / [K.(g/T).\{w'T'\}]$ where U is the friction velocity, K is von Karman's constant, g is the acceleration due to gravity, $\{ \}$ means take the average, w is the vertical speed, T is the air temperature and T' is the sample value minus the average value of T. The requirement for a low uncertainty of the variance of the sonic temperature measurement contributes to a low uncertainty of the covariance of temperature and vertical wind speed, especially because the uncertainty of the sonic temperature measurement itself is relatively large compared to that of the vertical wind speed and compared to the uncertainty of the variance of the sonic temperature.

12	Annex 01 / 2.3 / 47	Calibration certificate issued by accredited laboratory needed for all 214 sensors?	Yes, all sensors need to be delivered with a valid calibration certificate pertaining to that sensor in accordance with this mandatory.
13	Annex 01 / 3.4 / 68	What is meant by module?	"The sensor as a whole can be considered a single module. However, additional components, such as integrated sensors, may also be included.
14	Annex 01 / 4.2 / 79	Will a lightning protection bar be installed?	No, KNMI does not intend to install lightning rods on the wind masts.
15	Annex 01 / 4.2 / 82	If a minimum power is required, how should the power be distributed between the sensor arms and transducers?	KNMI does not prescribe the distribution of power. This Mandatory is intended to provide a minimum capability to keep the sensor ice-free during operation, and we leave the exact implementation up to the manufacturer.
16	Annex 01 / 4.6 / 93	Is damage caused by birds considered environmental damage?	Indeed, bird damage is classified as environmental damage. Please refer to mandatory requirements #100 and #101, where bird damage is explicitly included.
17	Annex 01 / 6 / 100	What is the consequence if the availability of a wind sensor is lower than the indicated threshold after all the sensors have been installed?	Remedial actions must be undertaken at all times to ensure compliance. Failure to meet the requirements may result in penalties or the premature termination of the agreement, as outlined in the draft Agreement.
18	Annex 01 / 6 / 103	What is the consequence if the availability of a wind sensor is lower than the indicated threshold after all the sensors have been installed?	"#103 is classified as a desirable requirement. In the absence of allocated points, there will be no direct consequences for not meeting the threshold. If points are assigned to the desirable criteria, remedial actions may still be required to maintain performance. However, penalties or termination of the agreement, as mentioned in question 17, are not applicable in this case unless explicitly stated in the final Agreement."
19	Annex 01; Item 61	Is the checksum only necessary for telegrams with measured values or also for parameter telegrams, e.g. reading and writing the baud rate? In our view, this only necessary for the data telegrams.	A checksum is preferred for a data message with measured values and/or data codes from the wind sensor to ensure correct receipt of telegrams. If a checksum is provided as a data integrity check, the method used for calculating the checksum must also be included. Please also refer to the revised #61 #62 #63 in Program of Requirements and Desirables version 1.1 (Annex 01).

20	Annex 01; Item 62	Is the <STX> ... <ETX> frame only necessary for telegrams with measured values or also for parameter telegrams, e.g. reading and writing the baud rate?	A data message with measured values and/or data codes returned from a sensor should have defined start and end characters (preferably <STX> and <ETX>) to indicate the main data payload. This is particularly critical when multi-line messages are returned, as it requires the definition of line delimiters. Using standard start/end characters, combined with a checksum, ensures that the data can be correctly parsed and that the message returned is complete and intact. Please also refer to the revised #61 #62 #63 in Program of Requirements and Desirables version 1.1 (Annex 01).
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