

RESPONSE TO REVIEWERS:

We wish to express our appreciation to the reviewers for their valuable comments on our paper. The comments have helped us significantly improve the paper.

We would like to respond to reviewer A's comments as follows:

**>Main comment:** *This paper describes the performance of Resonant Silicon Gauges (RSGs) manufactured by YOKOGAWA, which can be used as transfer standards for the international comparison. The linearity, stability, line pressure effect and so on were well characterized. The improved RSGs showed that digital manometers can be used as an excellent transfer standard. This paper is worthwhile to be published in the journal. However, it seemed that more careful investigations are required as follows. However, I would like to give some comments as follows*

**>Response:** We thank the reviewer for this pertinent comment.

**>Comment 1:** *In Page 2, the 10 kPa RSG was calibrated by the YOKOGAWA's pressure standards. What kinds of pressure standards were used? It is necessary to be mentioned in the manuscript. (RSG#A calibrated by NMIJ seems to be the standard though.)*

**>Response:** We agree with you. These calibrations were performed using YOKOGAWA's double pressure balances instead of RSG #A.

We have reflected this comment by changing the following text from (p. 2, lines 40–41):

“by comparison to YOKOGAWA's pressure standards.”

to

“by comparison to YOKOGAWA's double pressure balances.”

**>Comment 2:** *In Figure 4, the results of RSG#B was calibrated by RSG#A, and another RSG#C was calibrated by RSG#B which is calibrated by NMIJ.*

*The RSG#B results calibrated by national standards should be added in order to compare it with the results of RSG#B calibrated by RSG#A. It must have almost same or better deviation than RSG#C.*

**>Response:** We find that this point requires clarification about the calibration of RSG #C by this comment. We would like to arrange the relation between the RSGs and the pressure standards at adjustment and calibration. The RSG #B was adjusted using the RSG #A, and the RSG #C was adjusted using the RSG #B. On the other hand, both the RSG #B and the RSG #C were calibrated with NMIJ/AIST pressure standards after the adjustment. Figure 4 was obtained from the calibration results by NMIJ.

To clarify, we have added explanations of calibration as following (p. 3, lines 38-41):

“The calibration results of RSG #B and #C obtained with the NMIJ/AIST pressure standards were compared with the regression lines and the linearity comparisons were made.”

**>Comment 3:** *In section 4.2, fundamentally, RSG#A, #B, #C might have a same performance. Only difference among them is traceability. So, even short-term stability should be verified by a national standard, not by comparing it with another RSG standard.*

*In general, the short-term stability should be better than the long-term stability, but it seems not.*

**>Response:** We agree that the RSG #A, #B and #C have same performance of the short- and the long-term stability because the stability depends largely on the sensor structures instead of the adjustment method. And the difference between the RSGs was the standard devices for adjustment. However, both the short- and the long-term stability were obtained from the calibration results with NMIJ/AIST pressure standards. The calibration results were the average values obtained by repeating the measurement five times in accordance with the procedures in subsection 4.1 (p. 3, lines 10-20). These five data were shown as the short-term stability in Fig.5 so that the repeatability of RSG was shown. On the other hand, the long-term stability was comparison of two calibration results performed on Mar. 2017 and Jan. 2018 in Fig.6.

To clarify, we have changed the following text from (p. 3, lines 45–48):

“Figure 5 shows the results of the measurement during pressure ascending processes. The pressure was ascended five times and measurement was carried out once for each. This confirmed the short-term stability.”

to

“Figure 5 shows each results of the measurement during five times of pressure ascending processes shown by procedures in subsection 4.1. This confirmed the repeatability of the 10 kPa RSG during the calibration process as the short-term stability.”

**>Comment 4:** *Minor correction. Coverage factor,  $k$  should be italic throughout the manuscript.*

**>Response:** In accordance with the reviewer’s comment, we have corrected the errors in captions of Figure 3, 9 and 10.

We resubmit our manuscript for a secondary evaluation. Thank you once again for your consideration of our paper.