

Temperature Calibration Certificate

Model : ARO-CAV
 Serial No. : 0282
 Date : December 13, 2016
 Location : Production Section
 Method : Calibration equation is determined from third order regression of samples of the reference temperature against instrument voltages. Samples are taken at approximately 3, 10, 17, 24, and 31 °C.

1. Equation Instrument temperature[°C] = $A+B \times V+C \times V^2+D \times V^3$ V: Instrument voltage[V]

2. Coefficients

A = -5.330229e+00
 B = +1.674193e+01
 C = -2.205295e+00
 D = +4.727080e-01

3. Calibration results

Reference temperature [°C]	Instrument voltage [V]	Instrument temperature [°C]	Residual error [°C]	Acceptance [°C]	OK/NG
2.254	0.48029	2.254	0.000	±0.020	OK
10.600	1.06708	10.598	-0.002	±0.020	OK
17.423	1.57587	17.426	0.003	±0.020	OK
24.180	2.07794	24.178	-0.002	±0.020	OK
30.591	2.53174	30.592	0.001	±0.020	OK

4. Verification

Criteria of judgement : Residual error of the instrument temperature at arbitrary point is within the acceptance value.

Reference temperature [°C]	Instrument temperature [°C]	Residual error [°C]	Acceptance [°C]	Judgement
20.071	20.069	-0.002	±0.020	Passed

Examined K. Shimotsu
 Approved a. Fukuoka

Dissolved Oxygen Calibration Certificate

Model : ARO-CAV
 Serial No. : 0282
 Date : December 13, 2016
 Location : Production Section
 Method : Calibration is performed with the nitrogen gas (zero) and the oxygen saturated water (span) kept by air bubbling.
 Film No. : 163010BA

1. Equation

$$DO[\%] = G + H \times P'$$

Here, P'[%] consists of the coefficients A-F determined by the initial calibration.

2. Coefficients

A = -4.468289e+01 E = +4.000000e-03
 B = +1.387686e+02 F = +5.150000e-05
 C = -3.146591e-01 G = +0.000000e+00
 D = +1.023100e-02 H = +1.000000e+00

3. Verification

Criteria of judgement : Residual error of the instrument DO at arbitrary point is within the acceptance value. The test is performed 3 times.

Acceptance: $\pm 0.5\%$ of full scale

Test for DO 0 %

	Test condition		Instrument DO [%]	Residual error [%]	Acceptance [%]	Judgement
	Atm. pressure [hPa]	Reference DO [%]				
1st	1013.2	0.00	0.01	0.01	± 1.00	Passed
2nd	1013.2	0.00	0.00	0.00	± 1.00	Passed
3rd	1013.2	0.00	-0.01	-0.01	± 1.00	Passed

Test for DO 100 %

	Test condition			Instrument DO [%]	Residual error [%]	Acceptance [%]	Judgement
	Water T. [°C]	Atm. pressure [hPa]	Reference DO [%]				
1st	25.0	1012.5	99.92	99.87	-0.05	± 1.00	Passed
2nd	25.0	1012.4	99.91	99.84	-0.07	± 1.00	Passed
3rd	25.0	1012.4	99.91	99.84	-0.07	± 1.00	Passed

Examined

M. Kano

Approved

a. Fukuoka