

# CALIBRATION CERTIFICATE

NAME	:	RINKO III
MODEL	:	ARO-CAV
SERIAL No.	:	0136
Parameter	:	Temperature Dissolved Oxygen



JFE

JFE Advantech Co., Ltd.

# Temperature Calibration Certificate

Model : ARO-CAV  
 Serial No. : 0136  
 Date : August 01, 2013  
 Location : Kobe 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  $\text{Instrument temperature}[\text{°C}] = A+B \times V+C \times V^2+D \times V^3$  V: Instrument voltage[V]

2. Coefficients  
 A = -5.398903e+00  
 B = +1.662853e+01  
 C = -2.129938e+00  
 D = +4.576025e-01

### 3. Calibration results

Reference temperature [°C]	Instrument voltage [V]	Instrument temperature [°C]	Residual error [°C]	Acceptance [°C]	OK/NG
3.582	0.57758	3.583	0.001	±0.020	OK
10.195	1.04627	10.191	-0.004	±0.020	OK
16.997	1.55298	17.002	0.005	±0.020	OK
24.305	2.09534	24.302	-0.003	±0.020	OK
31.285	2.58691	31.286	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
23.106	23.108	0.002	±0.020	Passed

Examined M. Kotsuji

Approved A. Fukuoka

JFE Advantech Co., Ltd.

# Dissolved Oxygen Calibration Certificate

Model : ARO-CAV  
 Serial No. : 0136  
 Date : August 02, 2013  
 Location : Kobe Production Section  
 Method : Calibration is performed with the nitrogen gas (zero) and the oxygen saturated water (span) kept by air bubbling.  
 Film No. : 132002A

## 1. Equation

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

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

## 2. Coefficients

A = -4.508937e+01      E = +4.400000e-03  
 B = +1.517357e+02      F = +0.000000e+00  
 C = -3.397361e-01      G = +0.000000e+00  
 D = +1.020000e-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:  $\pm 2\%$  of full scale

### Test for DO 0 %

	Test condition		Instrument DO [%]	Residual error [%]	Acceptance [%]	Judgement
	Atm. pressure [hPa]	Reference DO [%]				
1st	996.8	0.00	-0.01	-0.01	$\pm 4.00$	Passed
2nd	996.8	0.00	-0.05	-0.05	$\pm 4.00$	Passed
3rd	996.9	0.00	-0.07	-0.07	$\pm 4.00$	Passed

### Test for DO 100 %

	Test condition			Instrument DO [%]	Residual error [%]	Acceptance [%]	Judgement
	Water T. [°C]	Atm. pressure [hPa]	Reference DO [%]				
1st	25.0	996.9	98.33	98.29	-0.04	$\pm 4.00$	Passed
2nd	25.0	996.7	98.31	98.29	-0.02	$\pm 4.00$	Passed
3rd	25.0	996.8	98.32	98.16	-0.16	$\pm 4.00$	Passed

Examined

*M. Mishiro*

Approved

*A. Fukuoka*

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