



Certificate No.L0458-150525

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Chao - Li Co., Ltd.

CLC Technology Calibration Center

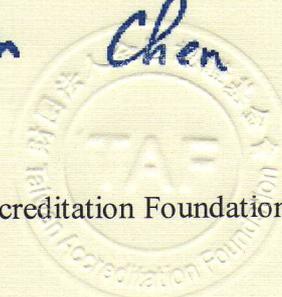
No.55, Jingji 7th Rd., Renwu Dist., Kaohsiung City 814, Taiwan (R.O.C.)

is accredited in respect of laboratory

Accreditation Criteria : ISO/IEC 17025:2005
Accreditation Number : 0458
Originally Accredited : April 01, 1998
Effective Period : April 01, 2013 to March 31, 2016
Accredited Scope : Calibration Field, see described in the Appendix

Jay-San Chen

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : May 25, 2015



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Accreditation Number : 0458

Laboratory Head : LIEN, Mein

Length

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KA1001 Gauge Block	CL-SCP-L17 /DOALL/112-RMI kaizer/(1.6,1.7,1.8,1.9,3 0,40,60,70,80,90) mm	Steel	
		(0.5 to 10) mm	0.16 μm
		(10.5 to 25) mm	0.22 μm
		(30 to 50) mm	0.30 μm
		(60 to 75) mm	0.39 μm
		(80 to 100) mm	0.48 μm
		Ceramic	
		(0.5 to 10) mm	0.17 μm
		(10.5 to 25) mm	0.23 μm
		(30 to 50) mm	0.34 μm
		(60 to 75) mm	0.45 μm
		(80 to 100) mm	0.55 μm
		Tungsten Carbide	
		(0.5 to 10) mm	0.20 μm
(10.5 to 25) mm	0.32 μm		
(30 to 50) mm	0.50 μm		
(60 to 75) mm	0.69 μm		
(80 to 100) mm	0.88 μm		
Chromic Carbide			
(0.5 to 10) mm	0.18 μm		
(10.5 to 25) mm	0.25 μm		
(30 to 50) mm	0.38 μm		
(60 to 75) mm	0.51 μm		
(80 to 100) mm	0.64 μm		
KA1002 plug gauge	CL-SCP-L12 /plug gauge DELTRONIC	Diameter	
		(1 to 5) mm	1.1 μm
		(0.0394 to 0.1969) in	(0.040 μin)
		(5 to 50) mm	1.2 μm
		(0.1969 to 1.9685) in	(0.048 μin)
		(50 to 70) mm	1.3 μm
		(1.9685 to 2.7559) in	(0.055 μin)



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KA1003 Ring gauge	CL-SCP-L16 /ring gauge DIATEST & BAKER	Diameter (1.75 to 30) mm	1.2 μm
KA1008 screw thread plug gauge (taper)screw thread plug gauge	screw, taper screw /wire gauge (pin gauge) & plug gauge DELTRONIC	screw thread major diameter: M1.6 to M10 M10 to M25 M25 to M70 screw thread pitch diameter: M1.6 to M70; thread angle: 29°、30°、 55°、60°、80° taper screw thread major diameter: (1/8 to 2) in taper screw thread pitch diameter: (1/8 to 2) in; thread angle: 55°、60°	1.5 μm 1.9 μm 2.1 μm 29° : 7.8 μm 30° : 7.5 μm 55° : 4.5 μm 60° : 4.2 μm 80° : 3.7 μm 4.4 μm 7.7 μm
KA1017 wire gauge (including pin gauge)	including pin gauge /pin gauge DELTRONIC	0.1446 mm to 4.0415 mm (0.00569 to 0.15911) inch	0.5 μm (0.020 μin)
KA1099 universal length measuring)(on-site calibration included)	CL-SCP-L15 /Gauge blocks	(0 to 100) mm	0.7 μm
KA1099 Coated standards	CL-SCP-L14 /universal length measuring system	11 μm to 50 μm > 50 μm to 125 μm > 125 μm to 500 μm > 500 μm to 1002 μm > 1002 μm to 1509 μm	0.8 μm 1.0 μm 1.0 μm 1.6 μm 1.6 μm



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KA2003 dial caliper vernier caliper digimatic caliper	CL-SCP-L01 /Mitutoyo 516-115 chiyeung (250 to 600) mm	(0 to 300) mm/0.02 mm (included 0.5 mm,1 mm, 2 mm,5 mm,10 mm, 15 mm,20 mm) (0 to 600) mm/0.02 mm (included 0.5 mm,1 mm, 2 mm,5 mm,10 mm, 15 mm,20 mm) (0 to 600) mm/0.01 mm (included 0.5 mm,1 mm, 2 mm,5 mm,10 mm, 15 mm,20 mm)	0.03 mm 0.02 mm 0.02 mm
KA2005 outside micrometer (digimatic) (vernier)	CL-SCP-L02 /chiyeung grade 1	(0 to 100) mm/0.001 mm (included 0.5 mm, 1 mm,1.25 mm,1.5 mm, 2 mm,3 mm)	0.002 mm
KA2008 height gauge (dial) (digimatic)	CL-SCP-L05 /kaizer,chiyeung grade 0, 1	(0 to 600) mm/0.01 mm	0.02 mm
KA2008 2D Height Gauge)(on-site calibration included)	CL-SCP-L10 /High Accuracy Check Master Mitutoyo / 515-742	(0 to 300) mm (> 300 to 590) mm	3.1 μm 3.8 μm
KA2010 dial indicator (dial) (digimatic)	CL-SCP-L03 /Mitutoyo 170-102M Mitutoyo 521-103	dial (0 to 10) mm/0.01 mm (0 to 1) mm/0.001 mm (1 to 5) mm/0.001 mm (0 to 25) mm/0.01 mm digimatic	0.007 mm 0.0008 mm 0.002 mm 0.008 mm
		(0 to 10) mm/0.001 mm (0 to 25) mm/0.001 mm	0.003 mm 0.005 mm
KA2010 dial test indicator (dial)	CL-SCP-L04 /Mitutoyo 521-103	(0 to 0.2) mm/0.002 mm (0 to 1.0) mm/0.01 mm	0.0020 mm 0.009 mm



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KA2015 Coating Thickness gauge	CL-SCP-L14 /Coated standards kett	Ferrous (Fe): (0 to 99.8) μm (> 99.8 to 491) μm (> 491 to 1509) μm Non-ferrous (NFe): (0 to 99.8) μm (> 99.8 to 491) μm (> 491 to 1002) μm	1.0 μm 2 μm 4 μm 1.0 μm 2 μm 4 μm
KA2015 Thickness Gauge	CL-SCP-L19 /Gauge block kaizer	(dial) (0 to 5) mm (solution : 0.001 mm) (0 to 30) mm (solution : 0.01 mm) (digimatic) (0 to 20) mm (solution : 0.001 mm)	0.003 mm 0.01 mm 0.004mm
KA4007 (New)profile projector(linear scale is aptotic)(on-site calibration included)	CL-SCP-L08 /scal standard: Mitutoyo/182-523/(0 to 300) mm & Nikon/(0 to 50) mm angle standard: Mitutoyo/990736 circular calibration gauge: carmar DC3-002C square ruler: GIN/GIN-H312	1.projector screen \leq 300 mm 2.span(linear scale is aptotic) X:(0 to 250) mm Y:(0 to 120) mm 3.circle: (0.1,0.2,0.508,1,2.54,5,10,16,16) mm 4.magnification 10X 20X 5.angle: 0 ° to 360 °	X:0.003 mm Y:0.003 mm 0.005 mm 0.042 % 0.011 % angle:59" (Included) angle:1.8' (Degrees rotation)



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KA4008 3D Coordinate Measuring Machine	CL-SCP-L18 /Gauge Block kaizer,Chiyeung standard sphere	axial: X:600 mm Y:600 mm Z:600 mm space: 600 mm probing error	X:3.2 μ m Y:3.2 μ m Z:3.2 μ m 3.3 μ m 0.9 μ m
KA4010 video measurement system(linear scale is aptotic)(on-site calibration included)	CL-SCP-L09 /scal standard: Mitutoyo/182-523/(0 to 300) mm angle standard: Mitutoyo990736 gauge block:carmar circular calibration gauge: carmar DC3-002C	1.span(linear scale is aptotic) X:(0 to 250) mm Y:(0 to 150) mm Z:(0 to 200) mm 2.space 300 mm 3.circle: (0.1,0.2,0.508,1,2.54,5,10 .16,16) mm 4.angle(Included): 0° to 360°	X:0.0027 mm Y:0.0020 mm Z:0.0033 mm 0.0031 mm 0.0033 mm 60"

Mass/Force

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KC1001 weight	CL-SCP-G04 /1 mg to 200 g/METTLER TOLEDO/E2 class 500 g/TROEMNER/E2 class 1 kg to 20 kg/DER HER/F1 class	1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g	0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.02 mg 0.03 mg 0.03 mg 0.03 mg 0.02 mg 0.02 mg 0.03 mg



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		10 g	0.04 mg
		20 g	0.04 mg
		50 g	0.07 mg
		100 g	0.07 mg
		200 g	0.17 mg
		500 g	1.0 mg
		1 kg	1.2 mg
		2 kg	17 mg
		5 kg	18 mg
		10 kg	89 mg
		20 kg	88 mg
		30 kg	92 mg
KC1002 electronic blance (not includes balance with built-in weights)(on-site calibration included)	CL-SCP-G01 /TROEMNER class E2 and HONOR class E2	1 mg to 200 g	0.29 mg
KC1004 electronic scale (on-site calibration included)	CL-SCP-G02, CL-SCP-G03 /HONOR grade class E2 HONOR grade class F1	200 g to 1 kg 1 kg to 6 kg 6 kg to 30 kg 0 kg to 60 kg(on site)	0.003 g 0.04 g 0.2 g 2 g
KC2004 Force gauge	ASTM E74-06 CL-SCP-G11 /Load Cell CELTRON/STC-100 kg	digimatic force gauge Tension 0 N to 98 N (0 to 10) kgf compression 0 N to 98 N (0 to 10) kgf dial force gauge Tension 0 N to 196 N (0 to 20) kgf Tension 0 N to 490 N (0 to 50) kgf compression 0 N to 196 N (0 to 20) kgf compression 0 N to 490 N (0 to 50) kgf	0.09 N (0.009 kgf) 0.12 N (0.012 kgf) 1.1 N (0.11 kgf) 1.1 N (0.11 kgf) 2.7 N (0.27 kgf) 2.7 N (0.27 kgf)



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KC2005 Material testing machine(on-site calibration included)	ASTM E04-06	Tension	
	CL-SCP-G13 /Load Cell	4.9 kN to 49 kN (0.5 to 5) tonf	0.079 kN (8.0 kgf)
	JHSENSE/LM-10T	Compression	
	PT/DSC3	4.9 kN to 49 kN (0.5 to 5) tonf 49 kN to 186 kN (5 to 19) tonf	0.049 kN (5.0 kgf) 0.23 kN (23 kgf)
KC3001 Cylinder	ISO 4788	(0.1 ml ≤ V ≤ 10 ml)	0.021 ml
	CL-SCP-G09	(10 ml < V ≤ 100 ml)	0.17 ml
	/blance	(100 ml < V ≤ 250 ml)	0.35 ml
	AND/HR-200	(250 ml < V ≤ 500 ml)	0.78 ml
	AND/FP-6000	(500 ml < V ≤ 1000 ml) (1000 ml < V ≤ 2000 ml)	1.5 ml 2.9 ml
KC4001 Torque wrench	ISO 6789	(forward, backward)	
	CL-SCP-G05	(0.3 to 3) N m	0.032 N m
	/Torque wrench tester	(3 to 6) N m	0.11 N m
	TOHNICHI/200DOTE	(6 to 12) N m	0.18 N m
	2	(12 to 19) N m	0.29 N m
	TOHNICHI/2000DOT	(19 to 50) N m	0.83 N m
KC4002 Torque driver	ISO 6789	(forward, backward)	
	CL-SCP-G06	(0.05 to 0.50) N m	0.0060 N m
	/Torque meter	(0.50 to 0.70) N m	0.012 N m
	CEDAR/DI-9-0.8	(0.70 to 1.0) N m	0.013 N m
	CEDAR/DI-9M-8	(1.0 to 2.0) N m (2.0 to 4.0) N m	0.030 N m 0.060 N m
KC5001 Rockell Hardness	ISO 6508	HRA	0.8
	CL-SCP-G14	HRB	1.4
Test Block	/Rockwell hardness standard block	HRC	0.6
	WILSON,Diamond HRA,HRB,HRC, HR30N	HR 30N	1.1



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KC5001 Vicker hardness test block	ISO 6507	HV0.1	22
	CL-SCP-G14-1	HV0.3	23
	/Vicker hardness standard block	HV0.5	21
	Kuang/Diamond HV	HV1.0	21
KC5002 Rockwell hardness tester (on-site calibration included)	ISO 6508	Hardness	
	CL-SCP-G15	(63.5 to 76.1) HRA	0.8
	/Rockwell hardness standard block	(76.1 to 83.9) HRA	0.6
	WILSON,Diamond,OL	(40.3 to 70.8) HRBW	1.6
	Y,NIM	(70.8 to 94.0) HRBW	1.4
	HRA,HRB,HRC, HR30N	(28.4 to 63.3) HRC	0.7
	Load Cell		
	PT/DSC1-300 kg	(49.6 to 78.5)HR 30N	1.5
	CELTRON/	Load	
	STC-100 kgf	Rockwell superficial Hardness Load (29.4 to 441) N (3 to 45) kgf	0.13 N 0.013 kgf
	Rockwell Hardness Load (392 to 1471) N (40 to 150) kgf	4.0 N 0.40 kgf	
KC5002 Vicker hardness tester (on-site calibration included)	ISO 6507	automatic measuring hardness	
	CL-SCP-G15-1	(190 to 720) HV0.1	3.4 %
	/Vicker hardness standard block	(191 742)HV0.3	3.1 %
	Kuang/Diamond	(215 to 753) HV0.5	2.8 %
	HV	(189 to 731) HV1.0	2.9 %
	Load Cell	manual measuring	
	PT/ST4	hardness	
	Reference scale standard	(190 to 720) HV0.1	3.5%
OLYMPUS/OB-MM		(191 to 742)HV0.3	3.3%
		(215 to 753) HV0.5	3.0%
		(189 to 731) HV1.0	3.0%



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KC5099 Shore Durometer	CL-SCP-G12 /Load Cell: PT/ST4-2 kg PT/ST3-10 kg	Load (0.4 to 9.8) N (40 to 1000) gf automatic measuring scale	4.0 mN 0.40 gf
		0.1 mm manual measuring scale (0.01 to 0.2) mm	0.61 μ m 0.65 μ m
		(10 to 95) Shore (20.7 to 113.3) gf	0.9 gf(0.9 Shore)
		(56.1 to 821.1) gf (0 to 4533) gf	4.6 gf(0.7 Shore) 28 gf(0.7 Shore)

Pressure/Vacuum

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KD1004 pressure gauge (on-site calibration included)	CL-SCP-P01 /CRYSTAL/700BAR CRYSTAL/XP CONST/273	Pressure Gauge (Hydraulic Pressure) (0 to 0.4) MPa (0 to 4) kgf/cm ²	0.011 MPa (0.11 kgf/cm ²)
		(0.4 to 3.92) MPa (4 to 40) kgf/cm ²	0.016 MPa (0.16 kgf/cm ²)
		(3.92 to 24.5) MPa (40 to 250) kgf/cm ²	0.061 MPa (0.62 kgf/cm ²)
		(24.5 to 39.2) MPa (250 to 400) kgf/cm ²	0.12 MPa (1.2 kgf/cm ²)
		Digital Pressure Gauge (Hydraulic Pressure) (0 to 9.8) MPa (0 to 100) kgf/cm ²	0.017 MPa (0.17 kgf/cm ²)
		(9.8 to 49) MPa (100 to 500) kgf/cm ²	0.032 MPa (0.32 kgf/cm ²)



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KD1007 Differential Pressure Gauge(on-site calibration included)	CL-SCP-P02 /LOVE/HM28	Pressure Gauge (Air Pressure) (0 to 0.4) MPa (0 to 4) kgf/cm ²	0.0023 MPa (0.023 kgf/cm ²)
		(0.4 to 1.96) MPa (4 to 20) kgf/cm ²	0.023 MPa (0.23 kgf/cm ²)
		Digital Pressure Gauge (Air Pressure) 0 to 33.33 kPa (0 to 250) mmHg	0.16 kPa (1.2 mmHg)
		33.34 kPa to 1.96 MPa (0.34 to 20) kgf/cm ²	0.0023 MPa (0.023 kgf/cm ²)
		Low pressure gauge (0 to 34.5) kPa (0 to 5) psi	0.016 kPa 0.0022 psi
		(0 to 150) Pa (150 to 2000) Pa	2.1 Pa 5 Pa

Temperature/Humidity

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KE1001 liquid-in-glass thermometer	CL-SCP-T01 /HART 5628 HART 1529	(-50 to 150) °C	0.1 °C
		(150 to 300) °C	0.2 °C
KE1002 Platinum Resistance Thermometer Resistance Thermometer	CL-SCP-T03 /Platinum Resistance Thermometer HART/5628 Temperature Monitor HART/1529	(-50 to 300) °C	0.062 °C



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KE1004 Thermocouple	CL-SCP-L14 /Platinum Resistance Thermometer HART/5628 Temperature Monitor HART/1529 Thermocouple R TYPE FLUKE/5649 Digital Meter KEITHLEY/2001	(-50 to 250) °C (250 to 1000) °C	0.07 °C 0.85 °C
KE1006 temperature indicator indicator of thermocouple thermometer (on-site calibration included)	CL-SCP-T02 /Universal temperature meter HART/1529 FLUKE/5500A	(calibration in laboratory) TYPE K (-100 to 1300) °C TYPE T (-100 to 400) °C TYPE J (-100 to 1200) °C TYPE E (-100 to 1000) °C TYPE R (0 to 1600) °C TYPE S (0 to 1600) °C TYPE N (-100 to 1300) °C RTD (-100 to 800) °C (on-site calibration) TYPE K (-100 to 1300) °C TYPE T (-100 to 400) °C TYPE J (-100 to 1200) °C TYPE E (-100 to 1000) °C TYPE R (0 to 1600) °C	0.79 °C 0.70 °C 0.69 °C 0.69 °C 1.1 °C 1.0 °C 1.2 °C 0.68 °C 1.2 °C 1.0 °C 0.90 °C 0.92 °C 2.1 °C



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KE1007 Ear Thermometer Thermometer	CL-SCP-T07 /Platinum Resistance Thermometer HART/5628 Temperature Monitor HART/1529	TYPE S (0 to 1600) °C	2.0 °C
		TYPE N (0 to 1300) °C	1.4 °C
		RTD (-100 to 800) °C	1.2 °C
		(35 to 41.5) °C	0.085 °C
KE1007 infrared thermometer	CL-SCP-T08 /Platinum Resistance Thermometer/OMEGA Thermocouple /OMEGA	(-30 to 50) °C	0.9 °C
		(50 to 100) °C	1.9 °C
		(100 to 500) °C	2.5 °C
KE1007 Thermal imagers	CL-SCP-T08 /Platinum Resistance Thermometer/OMEGA Thermocouple /OMEGA	(-20 to 50) °C	0.9 °C
		(50 to 100) °C	1.9 °C
		(100 to 500) °C	2.5 °C
KE1008 thermocouple simulator (on-site calibration included)	CL-SCP-T02 /Universal temperature meter HART/1529 FLUKE/5500A	(calibration in laboratory)	
		TYPE K (-100 to 1300) °C	0.79 °C
		TYPE T (-100 to 400) °C	0.70 °C
		TYPE J (-100 to 1200) °C	0.69 °C
		TYPE E (-100 to 1000) °C	0.69 °C
		TYPE R (0 to 1600) °C	1.1 °C



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		TYPE S (0 to 1600) °C	1.0 °C
		TYPE N (0 to 1300) °C	1.2 °C
		RTD (-100 to 800) °C (on-site calibration)	0.68 °C
		TYPE K (-100 to 1300) °C	1.2 °C
		TYPE T (-100 to 400) °C	1.0 °C
		TYPE J (-100 to 1200) °C	0.90 °C
		TYPE E (-100 to 1000) °C	0.92 °C
		TYPE R (0 to 1600) °C	2.1 °C
		TYPE S (0 to 1600) °C	2.0 °C
		TYPE N (0 to 1300) °C	1.4 °C
		RTD (-100 to 800) °C	1.2 °C
KE1009 temperature calibrator (on-site calibration included)	CL-SCP-T02 /Universal temperature meter HART/1529 FLUKE/5500A	(calibration in laboratory)	
		TYPE K (-100 to 1300) °C	0.79 °C
		TYPE T (-100 to 400) °C	0.70 °C
		TYPE J (-100 to 1200) °C	0.69 °C
		TYPE E (-100 to 1000) °C	0.69 °C
		TYPE R (0 to 1600) °C	1.1 °C
		TYPE S (0 to 1600) °C	1.0 °C
		TYPE N (0 to 1300) °C	1.2 °C



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		RTD (-100 to 800) °C (on-site calibration)	0.68 °C
		TYPE K (-100 to 1300) °C	1.2 °C
		TYPE T (-100 to 400) °C	1.0 °C
		TYPE J (-100 to 1200) °C	0.90 °C
		TYPE E (-100 to 1000) °C	0.92 °C
		TYPE R (0 to 1600) °C	2.1 °C
		TYPE S (0 to 1600) °C	2.0 °C
		TYPE N (0 to 1300) °C	1.4 °C
		RTD (-100 to 800) °C	1.2 °C
KE1010 Oven(on-site calibration included)	CL-SCP-T06 /Platinum Resistance ThermometerInterTech InterTech Electronic hygrometer Rotronic/hygropalm Data collection device Agilnet/34970A	(-20 to 130) °C (>130 to 200) °C	0.53 °C 1.0 °C
KE2001 Hygrometer	CL-SCP-T05 /Platinum Resistance ThermometerInterTech Electronic hygrometer Rotronic/hygropalm Data collection device Agilnet/34970A	(30 to 95) %RH	2.0 %RH



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KE2004 Hygrometer Temperature & Humidity recorder	CL-SCP-T05 /Platinum Resistance ThermometerInterTech Electronic hygrometer Rotronic/hygropalm Data collection device Agilnet/34970A	Hygrometer Temperature: (15 to 35) °C Humidity:(30 to 95) %RH Temperature & Humidity recorder Temperature: (15 to 35) °C Humidity:(30 to 95) %RH	0.53 °C 1.8 %RH 0.77 °C 1.9 %RH
KE2005 Constant temperature and humidity machine)(on-site calibration included)	CL-SCP-T06 /Platinum Resistance ThermometerInterTech InterTech Electronic hygrometer Rotronic/hygropalm Data collection device Agilnet/34970A	(-20 to 130) °C (>130 to 200) °C (30 to 95) %RH	0.53 °C 1.0 °C 2.0 %RH

Electricity

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KF1001 DC Voltage source DC Voltage meter	CL-SCP-E01 /Agilent 3458A FLUKE 5500A	DC Voltage source: 10 mV 100 mV 1 V 10 V 100 V 1000 V 10 mV to 100 mV >100 mV to 1 V >1 V to 10 V >10 V to 100 V >100 V to 1000 V	87 μV/V 22 μV/V 17 μV/V 16 μV/V 17 μV/V 18 μV/V 0.18 mV/V 0.16 mV/V 17 μV/V 18 μV/V 49 μV/V



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		DC Voltage meter: 10 mV 100 mV 1 V 10 V 100 V 1000 V	0.42 mV/V 0.11 mV/V 65 μ V/V 65 μ V/V 70 μ V/V 67 μ V/V
		10 mV to 100 mV >100 mV to 1 V >1 V to 10 V >10 V to 100 V >100 V to 1000 V	0.45 mV/V 0.29 mV/V 66 μ V/V 71 μ V/V 80 μ V/V
KF1002 DC Current shunt(on-site calibration included)	CL-SCP-E11 /PRODIGIT 7550A Agilent 3458A	1 A to 20 A > 20 A to 40 A	0.42 m Ω / Ω 0.44 m Ω / Ω
KF1002 DC Current source DC Current meter	CL-SCP-E02 /Agilent 3458A FLUKE 5500A	DC Current source: 100 μ A 1 mA 10 mA 100 mA 1 A	49 μ A/A 42 μ A/A 42 μ A/A 63 μ A/A 0.15 mA/A
		100 μ A to 1 mA >1 mA to 10 mA >10 mA to 100 mA >100 mA to 1 A DC Current meter: 100 μ A 1 mA 10 mA	0.33 mA/A 0.33 mA/A 0.30 mA/A 0.45 mA/A 0.72 mA/A 0.21 mA/A 0.15 mA/A
		100 mA 1 A 100 μ A to 1 mA >1 mA to 10 mA >10 mA to 100 mA >100 mA to 1 A	0.17 mA/A 0.42 mA/A 0.75 mA/A 0.42 mA/A 0.33 mA/A 0.42 mA/A



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KF1003 DC High Voltage source(on-site calibration included)	CL-SCP-E06 /Chroma 900A Zentech 900B-HV	1 kV to 6 kV	8.4 mV/V
		> 6 kV to 12 kV	6.4 mV/V
		>12 kV to 20 kV	9.2 mV/V
		>20 kV to 30 kV	8.0 mV/V
		>30 kV to 40 kV	7.3 mV/V
KF1003 DC High Voltage meter(on-site calibration included)	CL-SCP-E06 /Chroma 900A Zentech 900B-HV	1 kV to 6 kV	8.4 mV/V
		> 6 kV to 12 kV	6.4 mV/V
		> 12 kV to 20 kV	16 mV/V
		> 20 kV to 40 kV	15 mV/V
KF1004 DC High Current source(on-site calibration included) DC High Current meter(on-site calibration included)	CL-SCP-E08 /PRODIGIT 7550A Agilent 3458A	DC High Current source:	
		1 A to 20 A	3.6 mA/A
		> 20 A to 80 A	0.50 mA/A
		> 80 A to 120 A	0.76 mA/A
		DC High Current meter:	
		1 A to 20 A	3.7 mA/A
KF1011 AC Voltage source AC Voltage meter	CL-SCP-E03 /Agilent 3458A FLUKE 5500A	AC Voltage source:	
		10 mV (@1 kHz)	0.53 mV/V
		100 mV (@1 kHz)	0.12 mV/V
		1 V (@1 kHz)	0.12 mV/V
		10 V (@1 kHz)	0.12 mV/V
		100 V (@1 kHz)	0.26 mV/V
		750 V (@1 kHz)	0.59 mV/V
		10 mV (@60 Hz)	0.47 mV/V
		100 mV (@60 Hz)	0.12 mV/V
		1 V (@60 Hz)	0.12 mV/V
		10 V (@60 Hz)	0.12 mV/V
		100 V (@60 Hz)	0.26 mV/V
		750 V (@60 Hz)	0.59 mV/V
		10 mV (@50 Hz)	0.47 mV/V
		100 mV (@50 Hz)	0.12 mV/V
		1 V (@50 Hz)	0.12 mV/V
10 V (@50 Hz)	0.12 mV/V		
100 V (@50 Hz)	0.26 mV/V		
750 V (@50 Hz)	0.59 mV/V		



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		10 mV to 100 mV (@1 kHz)	33 mV/V
		>100 mV to 1V (@1 kHz)	3.7 mV/V
		>1 V to 10 V (@1 kHz)	2.4 mV/V
		>10 V to 100 V (@1 kHz)	3.3 mV/V
		>100 V to 750 V (@1 kHz)	3.3 mV/V
		10 mV to 100 mV (@60 Hz)	33 mV/V
		>100 mV to 1V (@60 Hz)	3.8 mV/V
		>1 V to 10 V (@60 Hz)	2.2 mV/V
		>10 V to 100 V (@60 Hz)	2.2 mV/V
		>100 V to 750 V (@60 Hz)	2.1 mV/V
		AC Voltage meter:	
		10 mV (@1 kHz)	4.0 mV/V
		100 mV (@1 kHz)	0.81 mV/V
		1 V (@1 kHz)	0.54 mV/V
		10 V (@1 kHz)	0.69 mV/V
		100 V (@1 kHz)	0.91 mV/V
		750 V (@1 kHz)	0.91 mV/V
		10 mV (@60 Hz)	4.0 mV/V
		100 mV (@60 Hz)	0.80 mV/V
		1 V (@60 Hz)	0.43 mV/V
		10 V (@60 Hz)	0.54 mV/V
		100 V (@60 Hz)	0.69 mV/V
		750 V (@60 Hz)	0.91 mV/V
		10 mV (@50 Hz)	4.0 mV/V
		100 mV (@50 Hz)	0.81 mV/V
		1 V (@50 Hz)	0.43 mV/V
		10 V (@50 Hz)	0.54 mV/V
		100 V (@50 Hz)	0.70 mV/V
		750 V (@50 Hz)	0.91 mV/V
		10 mV to 100 mV (@1 kHz)	42 mV/V
		>100 mV to 1V (@1 kHz)	28 mV/V
		>1 V to 10 V (@1 kHz)	28 mV/V
		>10 V to 100 V (@1 kHz)	32 mV/V
		>100 V to 750 V (@1 kHz)	32 mV/V



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KF1012 AC Current source AC Current meter	CL-SCP-E04 /Agilent 3458A FLUKE 5500A	10 mV to 100 mV (@60 Hz)	33 mV/V
		>100 mV to 1V (@60 Hz)	4.7 mV/V
		>1 V to 10 V (@60 Hz)	3.5 mV/V
		>10 V to 100 V (@60 Hz)	11 mV/V
		>100 V to 750 V (@60 Hz)	11 mV/V
		AC Current source:	0.57 mA/A
		1 mA (@1 kHz)	0.57 mA/A
		10 mA (@1 kHz)	0.57 mA/A
		100 mA (@1 kHz)	1.4 mA/A
		1 A (@1 kHz)	
		1 mA (@60 Hz)	0.91 mA/A
		10 mA (@60 Hz)	0.91 mA/A
		100 mA (@60 Hz)	0.91 mA/A
		1 A (@60 Hz)	1.2 mA/A
		1 mA (@50 Hz)	0.91 mA/A
		10 mA (@50 Hz)	0.91 mA/A
		100 mA (@50 Hz)	0.91 mA/A
		1 A (@50 Hz)	1.2 mA/A
		1 mA to 10 mA (@1 kHz)	3.7 mA/A
		>10 mA to 100 mA (@1 kHz)	3.7 mA/A
>100 mA to 1 A (@1 kHz)	3.5 mA/A		
1 mA to 10 mA (@60 Hz)	3.6 mA/A		
>10 mA to 100 mA (@60 Hz)	3.6 mA/A		
>100 mA to 1 A (@60 Hz)	3.7 mA/A		
AC Current meter:			
1 mA (@1 kHz)	1.6 mA/A		
10 mA (@1 kHz)	1.5 mA/A		
100 mA (@1 kHz)	1.5 mA/A		
1 A (@1 kHz)	2.0 mA/A		
1 mA (@60 Hz)	1.8 mA/A		
10 mA (@60 Hz)	1.7 mA/A		
100 mA (@60 Hz)	1.7 mA/A		
1 A (@60 Hz)	1.9 mA/A		



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		1 mA (@50 Hz) 10 mA (@50 Hz) 100 mA (@50 Hz) 1 A (@50 Hz) 1 mA to 10 mA (@1 kHz) >10 mA to 100 mA (@1 kHz) >100 mA to 1 A (@1 kHz)	1.8 mA/A 1.7 mA/A 1.7 mA/A 1.9 mA/A 3.9 mA/A 3.9 mA/A 3.8 mA/A
		1 mA to 10 mA (@60 Hz) >10 mA to 100 mA (@60 Hz) >100 mA to 1 A (@60 Hz)	3.9 mA/A 3.9 mA/A 4.0 mA/A
KF1012 AC Current shunt(on-site calibration included)	CL-SCP-E12 /PRODIGIT 7550A Agilent 3458A	1 A to 10 A (@60 Hz & @50 Hz) >10 A to 40 A (@60 Hz)	1.3 mΩ/Ω 1.3 mΩ/Ω
KF1013 AC High Voltage source(on-site calibration included)	CL-SCP-E07 /Chroma 900A	1 kV to 5 kV (@60 Hz) > 5 kV to 10 kV (@60 Hz)	15 mV/V 13 mV/V
KF1013 AC High Voltage meter(on-site calibration included)	CL-SCP-E07 /Chroma 900A	1 kV to 5 kV (@60 Hz) > 5 kV to 10 kV (@60 Hz)	15 mV/V 13 mV/V
KF1014 AC High Current source(on-site calibration included) AC High Current meter(on-site calibration included)	CL-SCP-E09 /PRODIGIT 7550A Agilent 3458A	AC High Current source: 1 A to 20 A (@60 Hz) >20 A to 40 A (@60 Hz) >40 A to 120 A (@60 Hz) 1 A to 10 A (@50 Hz)	3.9 mA/A 4.8 mA/A 5.0 mA/A 2.1 mA/A
		AC High Current meter: 1 A to 20 A (@60 Hz) >20 A to 40 A (@60 Hz) >40 A to 120 A (@60 Hz) 1 A to 10 A (@50 Hz)	4.0 mA/A 4.9 mA/A 4.9 mA/A 2.2 mA/A



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KF2001 A.C. Electrical Power source(on-site calibration included) A.C. Electrical Power meter(on-site calibration included)	CL-SCP-E10 /YOKOGAWA WT210	A.C. Electrical Power source: 120 V (1, 5, 10) A, Power Factor 1.0, 0.5 /Lag, 60 Hz 240 V (1, 5, 10) A, Power Factor 1.0, 0.5 /Lag, 60 Hz	2.4 mW/W
		A.C. Electrical Power meter: 120 V (1, 5, 10) A, Power Factor 1.0, 0.5 /Lag, 60 Hz 240 V (1, 5, 10) A, Power Factor 1.0, 0.5 /Lag, 60 Hz	3.3 mW/W
KF3001 resistor ohmmeter	CL-SCP-E05 /Agilent 3458A CROPICO/RBB4G CROPICO/MTS1A	resistor:	
		1 mΩ	0.59 mΩ/Ω
		10 mΩ	0.59 mΩ/Ω
		100 mΩ	0.13 mΩ/Ω
		1 Ω	0.14 mΩ/Ω
		1 Ω	73 μΩ/Ω
		10 Ω	53 μΩ/Ω
		100 Ω	35 μΩ/Ω
		1 kΩ	19 μΩ/Ω
		10 kΩ	19 μΩ/Ω
		100 kΩ	20 μΩ/Ω
		1 MΩ	77 μΩ/Ω
10 MΩ	0.17 mΩ/Ω		



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KF3001 High resistor(on-site calibration included) High ohmmeter(on-site calibration included)	CL-SCP-E13 /AVO-CB101 KEITHLEY 6514	ohmmeter:	
		1 mΩ	0.59 mΩ/Ω
		10 mΩ	0.59 mΩ/Ω
		100 mΩ	0.12 mΩ/Ω
		1 Ω	0.13 mΩ/Ω
		1 Ω	0.15 mΩ/Ω
		10 Ω	0.13 mΩ/Ω
		100 Ω	0.12 mΩ/Ω
		1 kΩ	0.12 mΩ/Ω
		10 kΩ	0.12 mΩ/Ω
		100 kΩ	0.12 mΩ/Ω
		1 MΩ	1.2 mΩ/Ω
		10 MΩ	1.2 mΩ/Ω
		High resistor:	
		10 MΩ	13 mΩ/Ω
		100 MΩ	13 mΩ/Ω
		1 GΩ	22 mΩ/Ω
		10 GΩ	22 mΩ/Ω
		High ohmmeter:	
		10 MΩ	13 mΩ/Ω
		100 MΩ	13 mΩ/Ω
1 GΩ	13 mΩ/Ω		
10 GΩ	13 mΩ/Ω		

Chemical

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KI9001 Volumetric flask pycnometer Specific gravity bottle	ISO 1042 CL-SCP-G09 /blance AND/HR-200 AND/FP-6000	Volumetric flask	Volumetric flask
		(1 ml ≤ V ≤ 10 ml)	0.0095 ml
		(10 ml < V ≤ 100 ml)	0.028 ml
		(100 ml < V ≤ 250 ml)	0.07 ml
		(250 ml < V ≤ 1000 ml)	0.20 ml
		(1000 ml < V ≤ 2000 ml)	0.51 ml
		pycnometer	pycnometer
		(5 ml < V ≤ 100 ml)	0.021 ml
		Specific gravity bottle	Specific gravity bottle
		Bottle Capacity 250 ml (@ Tube 24 ml)	0.07 ml



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KI9002 pipet	ISO 648 ; ISO 835	(0.1 ml \leq V \leq 1 ml)	1.4 μ l
	CL-SCP-G08	(1 ml < V \leq 10 ml)	3.0 μ l
	/blance	(10 ml < V \leq 30 ml)	6.9 μ l
	AND/HR-200 AND/FP-6000	(30 ml < V \leq 100 ml)	15 μ l
KI9003 Pipette Dispensers Digital bottleneck burettes Syringe	ISO 8655	The ten measuring piettes	The ten measuring pipettes
	CL-SCP-G07	(10 μ l \leq V \leq 100 μ l)	0.32 μ l
	/Blance	(100 μ l < V \leq 1000 μ l)	0.81 μ l
	Sartorius/Mc210s	(1000 μ l < V \leq 5000 μ l)	4.5 μ l
	AND/HR-200	(5000 μ l < V \leq 10000 μ l)	7.9 μ l
	CL-SCP-G07-1	The five measuring piettes	The five measuring pipettes
	/Blance	(10 μ l \leq V \leq 100 μ l)	0.37 μ l
	Sartorius/Mc210s	(100 μ l < V \leq 1000 μ l)	1.8 μ l
	AND/HR-200	(1000 μ l < V \leq 5000 μ l)	6.6 μ l
	ISO 8655	(5000 μ l < V \leq 10000 μ l)	14 μ l
	CL-SCP-G07	The ten measuring dispensers	The ten measuring dispensers
	/Blance	(10 μ l \leq V \leq 100 μ l)	0.41 μ l
	AND/HR-200	(100 μ l < V \leq 1000 μ l)	0.48 μ l
	AND/FP-6000	(1000 μ l < V \leq 2500 μ l)	0.55 μ l
	(2.5 ml \leq V \leq 10 ml)	17 μ l	
	(10 ml < V \leq 50 ml)	98 μ l	
	(50 ml < V \leq 100 ml)	0.18 ml	
	ISO 8655		
	CL-SCP-G17		
	/Blance		
	AND/HR-200		
	CL-SCP-G17-1		
	/Blance		
	AND/HR-200		
	/blance		



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		The five measuring dispensers $(10 \mu\text{l} \leq V \leq 100 \mu\text{l})$ $(100 \mu\text{l} < V \leq 1000 \mu\text{l})$ $(1000 \mu\text{l} < V \leq 2500 \mu\text{l})$ $(2.5 \text{ ml} \leq V \leq 10 \text{ ml})$ $(10 \text{ ml} < V \leq 50 \text{ ml})$ $(50 \text{ ml} < V \leq 100 \text{ ml})$	The five measuring dispensers $0.53 \mu\text{l}$ $0.53 \mu\text{l}$ $0.82 \mu\text{l}$ $17 \mu\text{l}$ 0.11 ml 0.18 ml
		The ten measuring digital burettes $(0.05 \text{ ml} \leq V \leq 25 \text{ ml})$ $(0.05 \text{ ml} \leq V \leq 50 \text{ ml})$	The ten measuring digital bottleneck burettes $14 \mu\text{l}$ $44 \mu\text{l}$
		The five measuring digital burettes $(0.05 \text{ ml} \leq V \leq 25 \text{ ml})$ $(0.05 \text{ ml} \leq V \leq 50 \text{ ml})$	The five measuring digital bottleneck burettes $22 \mu\text{l}$ $70 \mu\text{l}$
		The ten measuring Syringe $(10 \mu\text{l} \leq V \leq 100 \mu\text{l})$ $(100 \mu\text{l} < V \leq 1000 \mu\text{l})$	The ten measuring Syringe $0.36 \mu\text{l}$ $1.2 \mu\text{l}$
		The five measuring Syringe $(10 \mu\text{l} \leq V \leq 100 \mu\text{l})$ $(100 \mu\text{l} < V \leq 1000 \mu\text{l})$	The five measuring Syringe $0.54 \mu\text{l}$ $1.7 \mu\text{l}$
KI9099	ISO 4787	1.Burettes	
Burettes (return - flow included)	CL-SCP-G16 /Blance AND/HR-200	Nominal Value: 10 ml 25 ml 50 ml	$7.1 \mu\text{l}$ $8.6 \mu\text{l}$ $13 \mu\text{l}$



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Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
		2.Burettes (return - flow) Nominal Value: 10 ml 25 ml 50 ml	6.9 μ l 8.0 μ l 13 μ l

Time And Frequency

Calibration items	Calibration Method /Working Standard	Ranges	Smallest uncertainty
KJ0100 quartz clock and watch tester	CL-SCP-F03 /Frequency standard SRS/FS725	time base measurment 32768 Hz	0.84 ppm
KJ0100 Stopwatch Timer (on-site calibration included)	CL-SCP-F03 /Frequency standard SRS/FS725	time base measurement 32768 Hz time interval comparison (1 s to 9 h 59 min)	2.0 ppm 490 ms
KJ0200 crystal oscillator counter	CL-SCP-F01 /SRS FS725	10 MHz	7.1 E-10
KJ0300 Tachometer	CL-SCP-F02 /SRS FS-725	30 rpm to 12000 rpm >12000 rpm to 50000 rpm >50000 rpm to 90000 rpm	1.2 rpm 4.4 rpm 5.4 rpm
KJ0300 Stroboscope	CL-SCP-F02 /LINE SEIKI TM-5010	30 rpm to 3000 rpm >3000 rpm to 6000 rpm >6000 rpm to 12000 rpm >12000 rpm to 30000 rpm >30000 rpm to 60000 rpm >60000 rpm to 90000 rpm	1.5 rpm 2.0 rpm 4.4 rpm 9.5 rpm 17 rpm 23 rpm
KJ0300 Centrifuge (on-site calibration included)	CL-SCP-F02 /PROVA RM-1500	60 rpm to 600 rpm >600 rpm to 3000 rpm >3000 rpm to 12000 rpm >12000 rpm to 24000 rpm	1.3 rpm 1.5 rpm 4.4 rpm 8.4 rpm
(Null below)			

Remarks : Smallest uncertainty represents an expanded uncertainty using a coverage factor approximately 95 % level of confidence.



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Approval Signatory	Scope
WU, Yu-Ling	KA1002,KA1003,KA1008,KA1017,KA1099,KA1099,KA2003,KA2005,KA2008,KA2008,KA2010,KA2015,KA2015,KA4007,KA4008,KA4010,KC1001,KC1002,KC1004,KC3001,KC5001,KC5001,KC5002,KC5002,KC5099,KJ9001,KI9002,KI9003,KI9099
LIN, Feng-Ming	KC2004,KC2005,KC4001,KC4002,KC5002,KC5002,KD1004,KD1007,KE1001,KE1002,KE1004,KE1006,KE1007,KE1008,KE1009,KE1010,KE2001,KE2004,KE2005,KF1001,KF1002,KF1002,KF1003,KF1004,KF1011,KF1012,KF1012,KF1013,KF1014,KF2001,KF3001,KJ0100,KJ0100,KJ0200,KJ0300,KJ0300,KJ0300
LIEN, Mein	KA1001,KA1002,KA1003,KA1008,KA1017,KA1099,KA1099,KA2003,KA2005,KA2008,KA2008,KA2010,KA2015,KA2015,KA4007,KA4008,KA4010,KC1001,KC1002,KC1004,KC2004,KC2005,KC3001,KC4001,KC4002,KC5001,KC5001,KC5002,KC5002,KC5099,KD1004,KD1007,KE1001,KE1002,KE1004,KE1006,KE1007,KE1008,KE1009,KE1010,KE2001,KE2004,KE2005,KF1001,KF1002,KF1002,KF1003,KF1004,KF1011,KF1012,KF1012,KF1013,KF1014,KF2001,KF3001,KI9001,KI9002,KI9003,KI9099,KJ0100,KJ0100,KJ0200,KJ0300,KJ0300,KJ0300