

CALIBRATION CERTIFICATE**BEIJING ACI CONTROL TECHNOLOGY CO, LTD**

Customer Order Number:	C116616	End User Name:	Basf (Zhanjiang) Project
Serial Number:	740028 (Calibration Group 1)	Part Number:	ST100A-70J2120FA0F3EEAEA07
Purchase Order Number:	NFA234153	FCI Calibration Procedure:	19EN000073 Rev. A
Customer Flow Range:	5 to 50 NCMH	Local Tag #1:	134F 300901_T
Customer Line Size:	82.8 mm i.d. 3 inch sch10	Local Tag #2:	N/A
Customer Temperature Range:	0 to 65 deg C	Local Tag #3:	N/A
Customer Pressure Range:	600 to 750 KPa(g)	Remote Tag #1:	N/A
Customer Installation:	Orientation Code F	Remote Tag #2:	N/A
Customer Standard Conditions:	0 deg C and 1.01325 Bar(abs)	Remote Tag #3:	N/A
Customer Actual Media:	Nitrogen		
FCI Calibration Media:	Air		

4-20 mA Output Information**Output #1:**

4-20 mA = 0 to 50 NCMH

Calibration Equation:

NCMH = 3.13 x mA - 12.50

(step = 5 NCMH @ 5.600 mA)

Output #2:

4-20 mA = -20 to 80 Deg C

Temperature Equation:

Deg C = 6.25 x mA - 45.00

(Based on manufacturer's recommended temperature vs. resistance equation)

Output #3:

4-20 mA = -20 to 80 Deg C

Temperature Equation:

Deg C = 6.25 x mA - 45.00

(Based on manufacturer's recommended temperature vs. resistance equation)

Calibration Notes

- Calibration performed using equipment traceable to N.I.S.T. (US National Institute of Standards and Technology) and ISO/IEC 17025, International Standards for Test lab Quality systems.
- Substitute gas and gas equivalency used for calibration.

Final Flow Verification performed on ICL Stand

<u>Desired NCMH Per Stand</u>	<u>Model ST100A Indicated NCMH</u>	<u>Actual % Reading Difference</u>	<u>Allowed % Reading Difference</u>
49.97	49.78	-0.38	±1.25
37.39	37.35	-0.12	±1.42
25.20	25.18	-0.11	±1.74
12.59	12.38	-1.64	±2.75

N.I.S.T. Traceable Equipment: ICL Stand

<u>Calibration Control Number</u>	<u>Calibration Date</u>	<u>Calibration Due date</u>	<u>Equipment Description</u>
EL-664	14-Feb-23	14-Feb-24	HP Data Acquisition Unit
EL-711	5-Sep-23	5-Sep-24	Frequency Counter
FM-044	12-Sep-23	12-Mar-24	1" Turbine Meter
FM-047	12-Sep-23	12-Mar-24	1.5" Turbine Meter
FM-080	12-Sep-23	12-Mar-24	4" Turbine Meter
PG-358	13-Mar-23	13-Mar-24	Pressure Transducer
TE-034	13-Mar-23	13-Mar-24	Temperature RTD

Technician: J. Rea



Calibration Date: 01-25-24

CALIBRATION CERTIFICATE**BEIJING METALS AND MINERALS CORP.**

Customer Order Number:	C116616	End User Name:	
Serial Number:	740028 (Calibration Group 2)	Part Number:	ST100A-70J2120FA0F3EEAEA07
Purchase Order Number:	N/A	FCI Calibration Procedure:	19EN000073 Rev. A
Customer Flow Range:	30 to 3000 NCMH	Local Tag #1:	N/A
Customer Line Size:	82.8 mm i.d. 3 inch sch10	Local Tag #2:	N/A
Customer Temperature Range:	0 to 65 deg C	Local Tag #3:	N/A
Customer Pressure Range:	600 to 750 KPa(g)	Remote Tag #1:	N/A
Customer Installation:	Orientation Code F	Remote Tag #2:	N/A
Customer Standard Conditions:	0 deg C and 1.01325 Bar(abs)	Remote Tag #3:	N/A
Customer Actual Media:	Nitrogen		
FCI Calibration Media:	Air		

4-20 mA Output Information**Output #1:**

4-20 mA = 0 to 3000 NCMH

Calibration Equation:NCMH = $187.50 \times \text{mA} - 750$

(step = 30 NCMH @ 4.160 mA)

Output #2:

4-20 mA = -20 to 80 Deg C

Temperature Equation:Deg C = $6.25 \times \text{mA} - 45.00$

(Based on manufacturer's recommended temperature vs. resistance equation)

Output #3:

4-20 mA = -20 to 80 Deg C

Temperature Equation:Deg C = $6.25 \times \text{mA} - 45.00$

(Based on manufacturer's recommended temperature vs. resistance equation)

Calibration Notes

- Calibration performed using equipment traceable to N.I.S.T. (US National Institute of Standards and Technology) and ISO/IEC 17025, International Standards for Test lab Quality systems.
- Substitute gas and gas equivalency used for calibration.

Final Flow Verification performed on ICL Stand

Desired NCMH Per Stand	Model ST100A Indicated NCMH	Actual % Reading Difference	Allowed % Reading Difference
3021	3016.6	-0.15	±1.25
2244.9	2239.3	-0.25	±1.42
1501.4	1490.9	-0.70	±1.75
739.4	732.6	-0.92	±2.78

N.I.S.T. Traceable Equipment: ICL Stand

<u>Calibration Control Number</u>	<u>Calibration Date</u>	<u>Calibration Due date</u>	<u>Equipment Description</u>
EL-664	14-Feb-23	14-Feb-24	HP Data Acquisition Unit
EL-711	5-Sep-23	5-Sep-24	Frequency Counter
FM-044	12-Sep-23	12-Mar-24	1" Turbine Meter
FM-047	12-Sep-23	12-Mar-24	1.5" Turbine Meter
FM-080	12-Sep-23	12-Mar-24	4" Turbine Meter
PG-358	13-Mar-23	13-Mar-24	Pressure Transducer
TE-034	13-Mar-23	13-Mar-24	Temperature RTD

Technician: J. Rea

315

Calibration Date: 01-25-24

C#:	C116616	Serial:	740028	Equipment	Equip. #	Cal. Due
Cust.:	BEIJING ACI CONTROL TECHNOLOGY...	Date:	January 25, 2024	(Act):	EL-851	05-Apr-24
Tag:	134F 300901_T	TagR1:	N/A	(Ref):	EL-846	13-Dec-24
TagL2:	N/A	TagR2:	N/A	DVM:	EL-848	01-May-24
TagL3:	N/A	TagR3:	N/A	250 ohm:	EL-869	11-May-24

Nominal Sensor Resistance:		1000 Ω	Test Tech.	System Firmware Version	
Temperature at Nominal Resistance:		0.0 C		2.05L	
Notes:		ST100A, calibration group 1.		Date	
				03 24 23	
				Checksum	
				2393F69	

Internal Resistance Check						4-20 mA Output Check			
Range	Exp'd Ohms	Meas'd Ohms	Diff. Ohms	Tol. Ohms	Results	Flow Rate	Expected mA	Meas'd VDC across 250 Ω	Meas'd mA
Low	59.577	59.577	0.00	0.50	Pass	0.000	4.00	1.000	4.00
Mid	99.118	99.121	0.00	0.50	Pass	25.00	12.00	3.000	12.00
High	148.93	148.94	0.01	0.50	Pass	50.00	20.00	5.000	20.00

Serial #:	740028	Anag. Out 2	Temperature	Curve	Spline	Oper. Mode:	AST
C Number:	C116616	4 mA:	-20	Spl1:	102.17, 8.546, 43.95	L2:	0.005588
Range		4 mA DAC2:	11390	Spl2:	192.43, 10.189, 81.70	L3:	0.0254
Cust Min:	0	20 mA:	80	Spl3:	240.74, 10.615, -3.59	Kbase_70F:	0.025931
Cust Max:	50	20 mA DAC2:	54496	Spl4:	284.08, 10.975, 42.29	Ktc:	0.525000
Flow Unit:	78 (NCMH)	Namur:	OFF, 54510	Spl5:	383.06, 11.703, 11.29	CalGas:	Air
Line Size0:	82.80000305	Anag. Out 3	Temperature	Spl6:	435.64, 12.08, -27.2	Cal_K1:	-0.00039068
Line Size1:	0	4 mA:	-20	Spl7:	509.82, 12.616, 98.97	Cal_K2:	0.00010571
Line Units:	mm	4 mA DAC3:	10417	Spl8:	574.74, 13.04, -168.	Cal_K3:	-6.644e-08
Correctors		20 mA:	80	Spl9:	671.82, 13.798, 406.7	Cal_K4:	3.002e-11
KFactor1:	0	20 mA DAC3:	53901	Spl10:	767.14, 14.201, -298.	Cal_Cp1:	1.035435
KFactor2:	1	Namur:	OFF, 53933	Spl11:	881.71, 14.84, 44.73	Cal_Cp2:	-0.00027999
KFactor3:	0	Normalization	Low Temp	Spl12:	1023.2, 15.719, 25.81	Cal_Cp3:	6.729e-07
KFactor4:	0	dR Gain:	1.250568032	Spl13:	1248.5, 16.891, 32.69	Cal_Cp4:	-2.737e-10
CalParams		dR Offset:	-1.85468494			Cal_u1:	8.270e-07
Min SFPS:	0.845770001	RefR Gain:	1.250712037			Cal_u2:	7.250e-08
Max SFPS:	10.33100032	RefR Offset:	0.028592469			Cal_u3:	-5.166e-11
Std. Dens.:	0.078089997	Low dR Gn:	1.250568032			Cal_u4:	2.116e-14
dR Min:	8.545999526	Low dR Off:	-1.85468494			CustGas:	Nitrogen
dR Max:	16.89100074	Low R Gn:	1.250712037			Cust_K1:	6.23e-05
Cal Ref:	1093.040039	Low R Off:	0.028592469			Cust_K2:	0.00010537
Heater	90 mA	Exc 1 DAC:	0			Cust_K3:	-7.19e-08
Htr 1 DAC:	18150	Exc 2 DAC:	0			Cust_K4:	3.14e-11
Htr 2 DAC:	35506	Mac Number:	140 31 100			Cust_Cp1:	1.086768
Core SN:	740028		191 72 146			Cust_Cp2:	-0.00034674
Anag. Out 1	Flow (HART)					Cust_Cp3:	7.08e-07
4 mA:	0					Cust_Cp4:	-2.73e-10
4 mA DAC1:	11767					Cust_u1:	3.13e-07
20 mA:	50					Cust_u2:	7.26e-08
20 mA DAC1:	55054					Cust_u3:	-5.38e-11
Namur:	OFF, 11193					Cust_u4:	2.21e-14

C#:	C116616	Serial:	740028	Equipment	Equip. #	Cal. Due
Cust.:	BEIJING METALS AND MINERALS CORP.	Date:	January 25, 2024	(Act):	EL-851	05-Apr-24
Tag:	N/A	TagR1:	N/A	(Ref):	EL-846	13-Dec-24
TagL2:	N/A	TagR2:	N/A	DVM:	EL-848	01-May-24
TagL3:	N/A	TagR3:	N/A	250 ohm:	EL-869	11-May-24

Nominal Sensor Resistance:	1000 Ω	Test Tech.	System Firmware Version
Temperature at Nominal Resistance:	0.0 C		2.05L
Notes:	ST100A, calibration group 2.		Date
			03 24 23
			Checksum
			2393F69

Internal Resistance Check						4-20 mA Output Check			
Range	Exp'd Ohms	Meas'd Ohms	Diff. Ohms	Tol. Ohms	Results	Flow Rate	Expected mA	Meas'd VDC across 250 Ω	Meas'd mA
Low	59.574	59.575	0.00	0.50	Pass	0.000	4.00	1.001	4.00
Mid	99.116	99.118	0.00	0.50	Pass	1500	12.00	3.000	12.00
High	148.93	148.94	0.01	0.50	Pass	3000	20.00	5.000	20.00

Serial #:	740028	Anag. Out 2	Temperature	Curve	Spline	Oper. Mode:	AST
C Number:	C116616	4 mA:	-20	Spl1:	609.47, 14.45, -4.67	L2:	0.005588
Range		4 mA DAC2:	11390	Spl2:	1467.1, 17.59, -27.0	L3:	0.0254
Cust Min:	0	20 mA:	80	Spl3:	2164.2, 20.541, 38.63	Kbase_70F:	0.025931
Cust Max:	3000	20 mA DAC2:	54496	Spl4:	2835.0, 22.786, 11.69	Ktc:	0.546000
Flow Unit:	78 (NCMH)	Namur:	OFF, 54510	Spl5:	4215.0, 26.751, -1.27	CalGas:	Air
Line Size0:	82.80000305	Anag. Out 3	Temperature	Spl6:	6257.2, 31.841, 71.31	Cal_K1:	-0.00039068
Line Size1:	0	4 mA:	-20	Spl7:	10296, 37.984, -11.1	Cal_K2:	0.00010571
Line Units:	mm	4 mA DAC3:	10417	Spl8:	15120, 44.091, 102.7	Cal_K3:	-6.644e-08
Correctors		20 mA:	80	Spl9:	22923, 50.562, -2.95	Cal_K4:	3.002e-11
KFactor1:	0	20 mA DAC3:	53901	Spl10:	30425, 55.977, 91.49	Cal_Cp1:	1.035435
KFactor2:	1	Namur:	OFF, 53933	Spl11:	38216, 60.366, 103.0	Cal_Cp2:	-0.00027999
KFactor3:	0	Normalization	Low Temp	Spl12:	45619, 63.869, 18.70	Cal_Cp3:	6.729e-07
KFactor4:	0	dR Gain:	1.250568032	Spl13:	53016, 67.102, 132.4	Cal_Cp4:	-2.737e-10
CalParams		dR Offset:	-1.85468494	Spl14:	61198, 70.319, -72.7	Cal_u1:	8.270e-07
Min SFPS:	5.051700115	RefR Gain:	1.250712037	Spl15:	73853, 75.469, 5.430	Cal_u2:	7.250e-08
Max SFPS:	611.9099731	RefR Offset:	0.028592469			Cal_u3:	-5.166e-11
Std. Dens.:	0.078089997	Low dR Gn:	1.250568032			Cal_u4:	2.116e-14
dR Min:	14.44999980	Low dR Off:	-1.85468494			CustGas:	Nitrogen
dR Max:	75.46900177	Low R Gn:	1.250712037			Cust_K1:	6.23e-05
Cal Ref:	1093.040039	Low R Off:	0.028592469			Cust_K2:	0.00010537
Heater	90 mA	Exc 1 DAC:	0			Cust_K3:	-7.19e-08
Htr 1 DAC:	18150	Exc 2 DAC:	0			Cust_K4:	3.14e-11
Htr 2 DAC:	35506	Mac Number:	140 31 100			Cust_Cp1:	1.086768
Core SN:	740028		191 72 146			Cust_Cp2:	-0.00034674
Anag. Out 1	Flow (HART)					Cust_Cp3:	7.08e-07
4 mA:	0					Cust_Cp4:	-2.73e-10
4 mA DAC1:	11767					Cust_u1:	3.13e-07
20 mA:	3000					Cust_u2:	7.26e-08
20 mA DAC1:	55054					Cust_u3:	-5.38e-11
Namur:	OFF, 11193					Cust_u4:	2.21e-14