

# ANALYTICAL CONDITIONS - FlashEA 1112 Analyzers

## Pressure, Flow, Temperature, GC Columns

Configuration	Pressure (kPa)		Flow (ml/min)			Temperature (°C)			GC Column (p/n)						
	O <sub>2</sub>	He	He carrier	He ref	O <sub>2</sub>	Left	Right	Oven	26008220 CHN	26008215 CHNS/NCS	26007800 Sulfur	26007900 Oxygen	26007820 N & N/Prot	26007920 NC	26070004 N-Brew & Lub
CHN	300	250	140	100	250	950	0	75	Oven	-	-	-	-	-	-
CHN/O	250	250	140	100	250	950	1060	75	Oven	-	-	Oven	-	-	-
CHNS	300	250	140	100	250	950	0	65	-	Oven	-	-	-	-	-
CHNS/O	250	250	140	100	250	950	1060	65	-	Oven	-	Oven	-	-	-
S	300	250	140	100	250	950	0	65	-	-	Oven	-	-	-	-
O	0	250	100	100	0	1060	0	65	-	-	-	Oven	-	-	-
N	300	250	140	100	250	950	840	50	-	-	-	-	External	-	-
N Lubricant	300	250	140	100	300	950	840	50	-	-	-	-	-	-	External
NC	300	250	140	100	250	950	840	50	-	-	-	-	-	Oven	-
NCS	300	250	140	100	250	950	0	65	-	Oven	-	-	-	-	-
NC-Filters	300	250	140	100	250	950	840	50	-	-	-	-	-	External	-
NC-Sediments	300	250	140	100	250	950	840	50	-	-	-	-	-	External	-
NC-Soils	300	250	140	100	250	950	840	50	-	-	-	-	-	External	-
N/Protein	300	250	140	100	300	950	840	50	-	-	-	-	External	-	-
N/Brew	300	250	140	100	300	950	840	50	-	-	-	-	-	-	External

### NOTE:

- 1) In CHN/O and CHNS/O configurations with 2 furnaces the Oxygen and Helium pressure must be the same (250 kPa).
- 2) The reactors must be installed and removed with the furnaces at room temperature.
- 3) Do not use mechanical tools to screw or unscrew the fixing nut.
- 4) Purge the oxygen line before connecting to the instrument.

## ANALYTICAL CONDITIONS - FlashEA 1112 Analyzers (continuation)

### Timing (in seconds)

Configuration	Run time	Oxygen Injection	Sample Delay	Ret Time N	Ret Time C	Ret Time H	Ret Time O	Ret Time S
CHN	500	5	12	52	74	215	-	-
CHNS	720	5	12	43	64	190	-	420
S	300	5	12	-	-	-	-	150
O	400	0	0	-	-	-	160	-
N	300	10	10	180	-	-	-	-
N Lubricant	400	8	10	240	-	-	-	-
NC	300	10	12	110	190	-	-	-
NCS	720	5	12	52	75	-	-	480
NC-Filters	300	10	12	110	190	-	-	-
NC-Sediments	300	10	12	110	190	-	-	-
NC-Soils	300	10	12	110	190	-	-	-
N/Protein	300	30	10	180	-	-	-	-
N-Brew	300	30	10	180	-	-	-	-

Note: the Retention Times are indicative, small variations can be possible from instrument to instrument.

### Integration Parameters, Time Events (these parameters are only as reference)

Configuration	Integration Parameters				Time Events			
	Peak Width	Peak Treshold	Minima Area	Skim Ratio	Inhibit Time	Peak Treshold	Peak Width	Skim Ratio
CHN	10	1	1000	8	30	-	80 at 200 s	-
CHNS	10	1	1000	8	30	0.1 at 300 s	80 at 200 s / 40 at 300 s	1 at 200 s
S	40	3	1000	8	100	-	-	-
O	30	3	1000	8	80	-	-	-
N	10	1	1000	8	120	-	-	-
N-Lubricant	20	1	1000	8	120	-	-	-
NC	10	1	5000	8	80	-	-	-
NCS	10	1	1000	8	30	0.1 at 300 s	40 at 300 s	--
NC-Filters	10	1	5000	8	80	-	-	-
NC-Sediments	10	1	5000	8	80	-	-	-
NC-Soils	10	1	5000	8	80	-	-	-
N/Protein	20	5	10000	8	120	-	-	-
N-Brew	20	5	10000	8	120	-	-	-

## ANALYTICAL TEST - FlashEA 1112 Analyzers

### Sequence of analysis, Theoretical Values, Range of concentration accepted

Configuration	Run 1	Run 2	Run 3	Run 4 to 5 (Standards)	Weight (mg)	Run 6 to 8 (Unknown)	Weight (mg)
CHN	Bypass: 2-3 mg Atropine	Bypass: MAS 200 R	Blank	3 Acetanilide	2 – 3	3 Cefdni	2 – 3
CHNS	Bypass: 2-3 mg Methionine	Bypass: MAS 200 R	Blank	3 Methionine	2 – 3	3 Sulfanilammide	2 – 3
S	Bypass: 2-3 mg Methionine	Bypass: MAS 200 R	Blank	3 Methionine	2 - 3	3 Sulfanilammide	2 - 3
O	Bypass: 2-3 mg Acetanilide	Bypass: MAS 200 R	Blank	3 Cefdni	2 – 3	3 Acetanilide	2 – 3
N	Bypass: 4-5 mg Acetanilide	Bypass: MAS 200 R	Blank	3 Acetanilide	4 - 5	3 Cefdni	4 – 5
N- Lubricant	Bypass: 3-5 mg Atropine	Bypass: MAS 200 R	Blank	3 Atropine	3 - 5	3 Lubricant	8 - 10
NC	Bypass : 4-5 mg Acetanilide	Bypass: MAS 200 R	Blank	3 Acetanilide	4 – 5	3 Cefdni	4 – 5
NCS	Bypass: 2-3 mg Methionine	Bypass: MAS 200 R	Blank	3 Methionine	2 - 3	3 Sulfanilammide	2 - 3
NC-Filters	Bypass: 4-5 mg Aspartic acid	Bypass: MAS 200 R	Blank	3 Aspartic acid	4 – 5	3 Soil	50 – 100
NC-Sediments	Bypass: 4-5 mg Aspartic acid	Bypass: MAS 200 R	Blank	3 Aspartic acid	4 – 5	3 Soil	50 – 100
NC-Soils	Bypass: 4-5 mg Aspartic acid	Bypass: MAS 200 R	Blank	3 Aspartic acid	4 – 5	3 Soil	50 – 100
N/Protein	Bypass: 50-100 mg Aspartic acid	Bypass: MAS 200 R	Blank	3 Aspartic acid	50–100	3 Pasta	200–300
N-Brew	Bypass: 50-100 mg Aspartic acid	Bypass: MAS 200 R	Blank	3 Aspartic acid	50–100	3 Pasta	200–300

### Theoretical Values, Range of concentration accepted, Blank Values

Sample	Theoretical % (range accepted)				
	% N	% C	% H	% S	% O
Acetanilide	10.36 (10.26-10.46)	-	-	-	11.84 (11.74-11.94)
Aspartic Acid	10.52 (10.42-10.62)	-	-	-	-
Cefdni	20.14 (19.94-20.34)	51.79 (51.49-52.09)	5.07 (4.99-5.15)	-	-
Pasta	1.99 ( 1.97-2.01)	-	-	0.135 (0.131-0.139)	-
Soil	0.193 (0.173-0.212)	2.003 (1.983-2.023)	-	0.033 (0.031-0.035)	-
Sulfanilammide	16.27 (16.11-16.43)	41.84 (41.54-42.04)	4.68 (4.61-4.75)	18.62 (18.44-18.80)	-
Lubricant	0.579 (0.563-0.595)				

Element	Area accepted
Blank MAS 200R	0 – 1000 uV/s
Blank Nitrogen	0 – 3000 uV/s (except N Lubricant, N/Protein and N-Brew); 0-4000 uV/s (for N Lubricant); 0 – 30000 uV/s (for N/Protein and N-Brew)
Blank Carbon	0 – 10000 uV/s (less than 15000 adding into the tin capsule 10 mg V2O5) except for NC Soils, Sediments and Filters where it is less than 25000 uV/s
Blank Hydrogen	0 – 20000 uV/s
Blank Sulfur	Absent
Blank Oxygen	0 – 5000 uV/s

# ANALYTICAL CONDITIONS - SERIE EA 1110 Analyzers

CONFIGURATION	HELIUM		OXYGEN			Comb. Temp. (°C)	Red. Temp. (°C)	Oven Temp. (°C)	GC Column Type	Cycle Time (Sec)	Sample Start (sec)	Sample Stop (sec)	Oxy Inj Time (sec)	Sampler
	P (kPa)	Flow <sup>(a)</sup> (ml/min)	P (kPa)	Flow (ml/min)	Loop (cc)									
EA 1110 CHN	150	140	150	40 - 60	10	1000 <sup>(b)</sup>	Off	60	Teflon PQS 2 mts,	240	13	40	60	AS 200
EA 1110 CHNS	150	140	150	40 - 60	10	1000	Off	60	Teflon PQSW 2 mts	240	13	40	60	AS 200
EA 1110 Oxygen	150	140	150	--	10	1060	Off	60	SS Mol. Sieve 1 mt	240	13	40	--	AS 200
NA 2500	150	140	150	40 - 60	25	1000 <sup>(b)</sup>	780 <sup>(c)</sup>	50	Teflon PQS <sup>(d)</sup> 2 mts	240	13	40	60	AS 200
NC 2500	150	140	150	40 - 60	25	1000 <sup>(b)</sup>	780 <sup>(c)</sup>	50	Teflon PQS <sup>(d)</sup> 2 mts	240	13	40	60	AS 200
NCS 2500	150	140	150	40 - 60	10	1000	Off	60	Teflon PQSW 2 mts	240	13	40	60	AS 200
NA 2100 Protein	150	140	150	80 - 100	50	900	780 <sup>(c)</sup>	120	Act. Carb 1 mt	240	0	60	90	AS 128
NA 1100 Protein	150	140	150	80 - 100	50	900	780 <sup>(c)</sup>	120	Act. Carb 1 mt	240	-- <sup>(f)</sup>	--	90	CM2
NA 2100 Brew	150	140	150	80 - 100	50 (3)	900	780 <sup>(c)</sup>	50	Act. Carb <sup>(e)</sup> 2 mts	240	0	60	90	AS128/AS2000
NA 2500 Lubricant	150	140	150	80 - 100	50	900	780 <sup>(c)</sup>	50	Act. Carb <sup>(e)</sup> 2 mts	240	0	60	90	AS 128
NC 2100 Soil	150	140	150	80 - 100	25 (10)	900	780 <sup>(c)</sup>	120	Teflon PQS <sup>(d)</sup> 2 mts	240	6-8 <sup>(g)</sup>	60	60	AS 128
NC 2100 Sediment	150	140	150	80 - 100	10 (3)	900	780 <sup>(c)</sup>	120	Teflon PQS <sup>(d)</sup> 2 mts	240	6-8 <sup>(g)</sup>	60	60	AS 128
NC 2100 Filters	150	140	150	80 - 100	25	900	780 <sup>(c)</sup>	120	Teflon PQS <sup>(d)</sup> 2 mts	240	6-8 <sup>(g)</sup>	60	60	AS 128
NC 2100 Waste Water	150	140	150	80 - 100	3	900	780 <sup>(c)</sup>	120	Teflon PQS <sup>(d)</sup> 2 mts	240	--	--	60	AS 2000

- Note:**
- (a) For Instruments before February 1997 set the helium flow to 120 ml/min.
  - (b) Using stainless steel combustion reactor set the temperature at 900°C.
  - (c) Using stainless steel reduction reactor set the temperature at 680°C.
  - (d) The column remain outside the oven.
  - (e) The column remain inside the oven.
  - (f) Push the lever of the manual sampler 5 seconds after the start.
  - (g) Verify that the sample drops at 13 sec.

## Supplied Gas Features

**Servo Air:** the servo air line may be supplied either by a cylinder or by a air compressor so long as the pressure on the line is between 300 and 400 kPa.

**Helium:** the helium minimum purity permitted is 99.995%. The pressure regulator fitted on the helium cylinder should be set between 300 and 400 kPa.

**Oxygen:** the oxygen minimum purity permitted is 99.995%. The pressure regulator fitted on the oxygen cylinder should be set between 300 and 400 kPa.

## ANALYTICAL TEST - SERIE EA 1110 Analyzers

Configuration	W (mg)	Standards Type	Linear Fit - CF					Standards analyzed as Unknown					
			N %	C %	H %	S %	O %	Type	N %	C %	H %	S %	O %
EA1110 CHN	2-3	2 Acetanilide 2 Atropine 2 Nicotinamide	≥ 0.999	≥0.9999	≥0.999	--	--	10 CEDFNI	20.14 (± 0.2)	51.79 (± 0.3)	5.07 (± 0.1)	--	--
EA1110 CHNS	2-3	2 Cystine 2 Sulfanilamide 2 BBOT	≥ 0.999	≥0.9999	≥0.999	≥0.999	--	10 Methionine	9.39 (± 0.1)	40.25 (± 0.3)	7.43 (± 0.1)	21.49 (± 0.2)	--
NA2500	5-10	1 Acetanilide 1 Atropine 1 Nicotinamide	≥ 0.999	--	--	--	--	5 CEDFNI	20.14 (± 0.2)	--	--	--	--
NC2500	2-5	1 Acetanilide 1 Atropine 1 Nicotinamide	≥ 0.999	≥0.9999	--	--	--	5 CEDFNI	20.14 (± 0.2)	51.79 (± 0.3)	--	--	--
NCS2500	2-3	2 Cystine 2 Sulfanilamide 2 BBOT	≥ 0.999	≥0.9999	--	≥0.999	--	10 Methionine	9.39 (± 0.1)	40.25 (± 0.3)	--	21.49 (± 0.2)	--
NA2100 Protein	30-40	1 Atropine 1 Methionine 1 Nicotinamide	≥ 0.999	--	--	--	--	5 Acetanilide	10.36 (± 0.1)	--	--	--	--
NA1100 Protein	30-40	1 Atropine 1 Methionine 1 Nicotinamide	≥ 0.999	--	--	--	--	5 Acetanilide	10.36 (± 0.1)	--	--	--	--
NA2100 Brew	30-40	1 Atropine 1 Methionine 1 Nicotinamide	≥ 0.999	--	--	--	--	5 Acetanilide	10.36 (± 0.1)	--	--	--	--
NA2500 Lubricant	30-40	1 Acetanilide 1 Atropine 1 Nicotinamide	≥ 0.999	--	--	--	--	5 CEDFNI	20.14 (± 0.2)	--	--	--	--
NC2100 Soil NC2100 Filters NC2100 Sediment	2-5	1 Acetanilide 1 Atropine 1 Nicotinamide	≥ 0.999	≥0.9999	--	--	--	5 CEDFNI	20.14 (± 0.2)	51.79 (± 0.3)	--	--	--
EA1110 Oxygen  or	2-3  2-3	1 Acetanilide 1 Atropine 1 CEDFNI 1 Cystine 1 Sulfanilamide 1 BBOT					≥ 0.999  ≥ 0.999	5 Nicotinamide  5 Methionine	--  --	--  --	--  --	--  --	13.10 (± 0.1)  21.45 (± 0.2)

## ANALYTICAL CONDITIONS - SERIE EA 1108 Analyzers

CONFIGURATION	HELIUM		OXYGEN			Comb. Temp. (°C)	Red. Temp (°C)	Oven Temp (°C)	GC Column Type	Cycle Time (Sec)	Sample Start (sec)	Sample Stop (sec)	Oxy Time (sec)	Sampler
	P (kPa)	Flow (ml/min)	P (kPa)	Flow (ml/min)	Loop (cc)									
EA 1108 CHN	80-100 <sup>(a)</sup>	120	100	40 - 60	10	1000 <sup>(c)</sup>	500	60	SS PQS 2 mts	240	10	40	60	AS 200
EA 1108 CHNS	80-100 <sup>(a)</sup>	120	100	40 - 60	10	1000	500	60	SS PQSW 2 mts	240	10	40	60	AS 200
EA 1108 Oxygen	80-100 <sup>(a)</sup>	120	100	--	10	1060	500	60	SS Mol Sieve 1mt	240	10	40	--	AS 200
NA 1500 Nitrogen	80-100 <sup>(a)</sup>	120	100	40 - 60	25	1000 <sup>(c)</sup>	780 <sup>(d)</sup>	50	SS PQS <sup>(e)</sup> 2 mts	240	10	40	60	AS 200
NA 1500 NC	80-100 <sup>(a)</sup>	120	100	40 - 60	25	1000 <sup>(c)</sup>	780 <sup>(d)</sup>	50	SS PQS <sup>(e)</sup> 3 mts	240	10	40	60	AS 200
NA 1500 NCS	80-100 <sup>(a)</sup>	120	100	40 - 60	10	1000	500	60	SS PQSW 2 mts	240	10	40	60	AS 200
NA 2000 Protein	150 <sup>(b)</sup>	120	150	80 - 100	50	900	780 <sup>(d)</sup>	120	Act. Carb 1 mt	240	0	60	90	AS 128
NA 1000 Protein	150 <sup>(b)</sup>	120	150	80 - 100	50	900	780 <sup>(d)</sup>	120	Act. Carb 1 mt	240	-- <sup>(g)</sup>	--	90	CM2
NA 2000 Brew	150 <sup>(b)</sup>	120	150	80 - 100	50 (3)	900	780 <sup>(d)</sup>	50	Act.Carb <sup>(f)</sup> 2 mts	240	0	60	90	AS128/AS2000

- Note:**
- (a) Set the pressure value to obtain 120 ml/min helium flow.
  - (b) The instrument has a mechanical flow regulator, turn it to obtain 120 ml/min helium flow.
  - (c) Using stainless steel combustion reactor set the temperature at 900°C.
  - (d) Using stainless steel reduction reactor set the temperature at 680°C.
  - (e) The column remain outside the oven.
  - (f) The column remain inside the oven.
  - (g) Push the lever of the manual sampler 5 seconds after the start.

### Supplied Gas Features

**Servo Air:** the servo air line may be supplied either by a cylinder or by a air compressor so long as the pressure on the line is between 300 and 400 kPa.  
**Helium:** the helium minimum purity permitted is 99.995%. The pressure regulator fitted on the helium cylinder should be set between 300 and 400 kPa.  
**Oxygen:** the oxygen minimum purity permitted is 99.995%. The pressure regulator fitted on the oxygen cylinder should be set between 300 and 400 kPa.