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Specifications for Model 8810A

ANGLE POSITION INDICATOR (API)

Two Synchro/Resolver Measurement and One Optional Reference Supply

FEATURES

- Direct replacement for all standard API Model 8810's
- High resolution Touch-Screen, Front Panel "jog wheel" or Front Panel USB mouse input for control / setup
- Two isolated Input Channels
- 0.0001° Resolution
- ±0.004° Accuracy (Optional ±0.0015°)
- LXI compatible
- Programmable display options
- Auto-ranging Signal and Reference
- 47 Hz to 20 KHZ Frequency Range
- DC rate or angle output
- Auto Phase Correction
- Optional 6 VA internal Reference
- Measures and displays Reference Voltage, frequency, and VL-L
- Ethernet, USB, IEEE-488 and parallel ports
- CE compliant



DESCRIPTION

The 8810A is a rack mount or bench top API featuring front panel controls (including touch screen display) and input terminals. This self-calibrating unit is furnished with factory installed rubber feet and foldaway tilt stand, and can also be installed in a 3.5" half rack slot. Using optional rack mounting brackets, the 8810A may be installed as a single unit in a full rack slot or as a tandem mount of two units in a full rack slot.

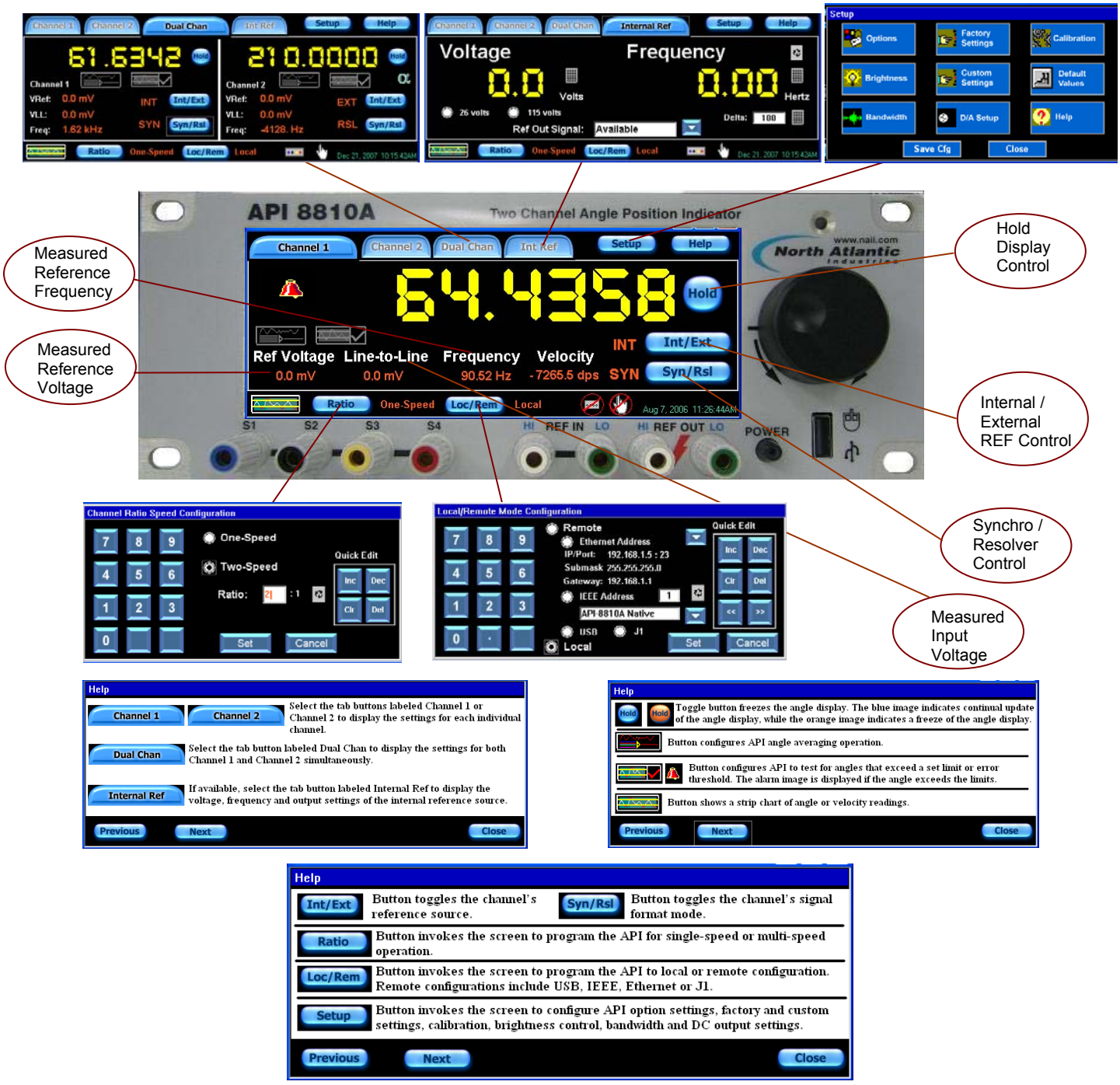
This second generation API truly represents a major step forward in Synchro-to-digital conversion technology. The use of an intelligent DSP design eliminates push buttons and allows all programming to be done either via an integrated touch-screen, front panel USB optical mouse interface or with the multi-purpose increment/setup knob. In addition, IEEE-488, Ethernet, and USB 2.0 interfaces have been added to extend remote operation capabilities. The display can be set for one of three display modes; 0-360º, ±180°, or Degrees, Minutes, Seconds. A wide frequency range (47 Hz to 20 KHz) is standard.

Improved flexibility is provided by two fully independent inputs that can be used to simultaneously read two separate input signals, or can be combined to measure multi-speed Synchros or Resolvers. The gear ratio, for the two-speed mode, is programmable from 2:1 to 255:1. Built-in phase correction eliminates errors caused by quadrature and harmonics when reference and signal are out of phase by as much as 60°.

The 8810A automatically accepts and displays input voltages from 1.0 to 90 V_{L-L} and Reference voltages from 2 to 115 Vrms over a broad frequency range of 47 Hz to 20 KHz. Therefore, one Instrument can handle most Synchro and Resolver measurement requirements.

The 8810A is a drop-in replacement for all variations of the previously supplied standard North Atlantic Industries Model 8810. For special versions (P/N = 8810 –Sxxxx), contact factory to determine compatibility.

Optional Reference: This design can also incorporate a 6 VA programmable reference generator that is used for stand alone applications (See P/N)


Measured Reference Frequency
Measured Reference Voltage
Hold Display Control
Internal / External REF Control
Synchro / Resolver Control
Measured Input Voltage
API 8810A
Two Channel Angle Position Indicator
64.4358
Hold
Int/Ext
Syn/Rsl
Ref Voltage
Line-to-Line
Frequency
Velocity
0.0 mV
0.0 mV
90.52 Hz
-7265.5 dps
SYN
Ratio
One-Speed
Loc/Rem
Local
Channel Ratio Speed Configuration
One-Speed
Two-Speed
Ratio:
Quick Edit
Set
Cancel
Local/Remote Mode Configuration
Remote
Ethernet Address
IP/Port: 192.168.1.5 : 23
Submask 255.255.255.0
Gateway: 192.168.1.1
IEEE Address
API 8810A Native
USB
J1
Local
Help
Channel 1
Channel 2
Select the tab buttons labeled Channel 1 or Channel 2 to display the settings for each individual channel.
Dual Chan
Select the tab button labeled Dual Chan to display the settings for both Channel 1 and Channel 2 simultaneously.
Internal Ref
If available, select the tab button labeled Internal Ref to display the voltage, frequency and output settings of the internal reference source.
Previous
Next
Close
Toggle button freezes the angle display. The blue image indicates continual update of the angle display, while the orange image indicates a freeze of the angle display.
Button configures API angle averaging operation.
Button configures API to test for angles that exceed a set limit or error threshold. The alarm image is displayed if the angle exceeds the limits.
Button shows a strip chart of angle or velocity readings.
Int/Ext
Button toggles the channel's reference source.
Syn/Rsl
Button toggles the channel's signal format mode.
Ratio
Button invokes the screen to program the API for single-speed or multi-speed operation.
Loc/Rem
Button invokes the screen to program the API to local or remote configuration. Remote configurations include USB, IEEE, Ethernet or J1.
Setup
Button invokes the screen to configure API option settings, factory and custom settings, calibration, brightness control, bandwidth and DC output settings.

SPECIFICATIONS

Resolution:	0.0001°
Input Channels:	2 separate isolated Inputs
Signal Inputs:	Ch.1: Synchro/Resolver programmable; 1 - 90V_{L-L} auto-ranging Ch.2: Synchro/Resolver programmable; 1 - 90V_{L-L} auto-ranging Each channel measures the Input V_{L-L}, Reference voltage and frequency. Data is displayed on the front panel and also available via various digital outputs.
Accuracy:	See detailed Accuracy Specifications below.
Frequency Range:	47 Hz – 20 kHz. See detailed Accuracy Specifications below.
Angular Range:	0.0000°-359.9999° or ±179.9999° programmable, or output angle can be viewed in degrees, minutes and seconds
Two-speed mode:	Both inputs can be combined with a ratio from 2 to 255
Reference Voltage:	2V to 115 V auto-ranging
Reference Frequency:	47 Hz – 20 kHz

Input Impedance:

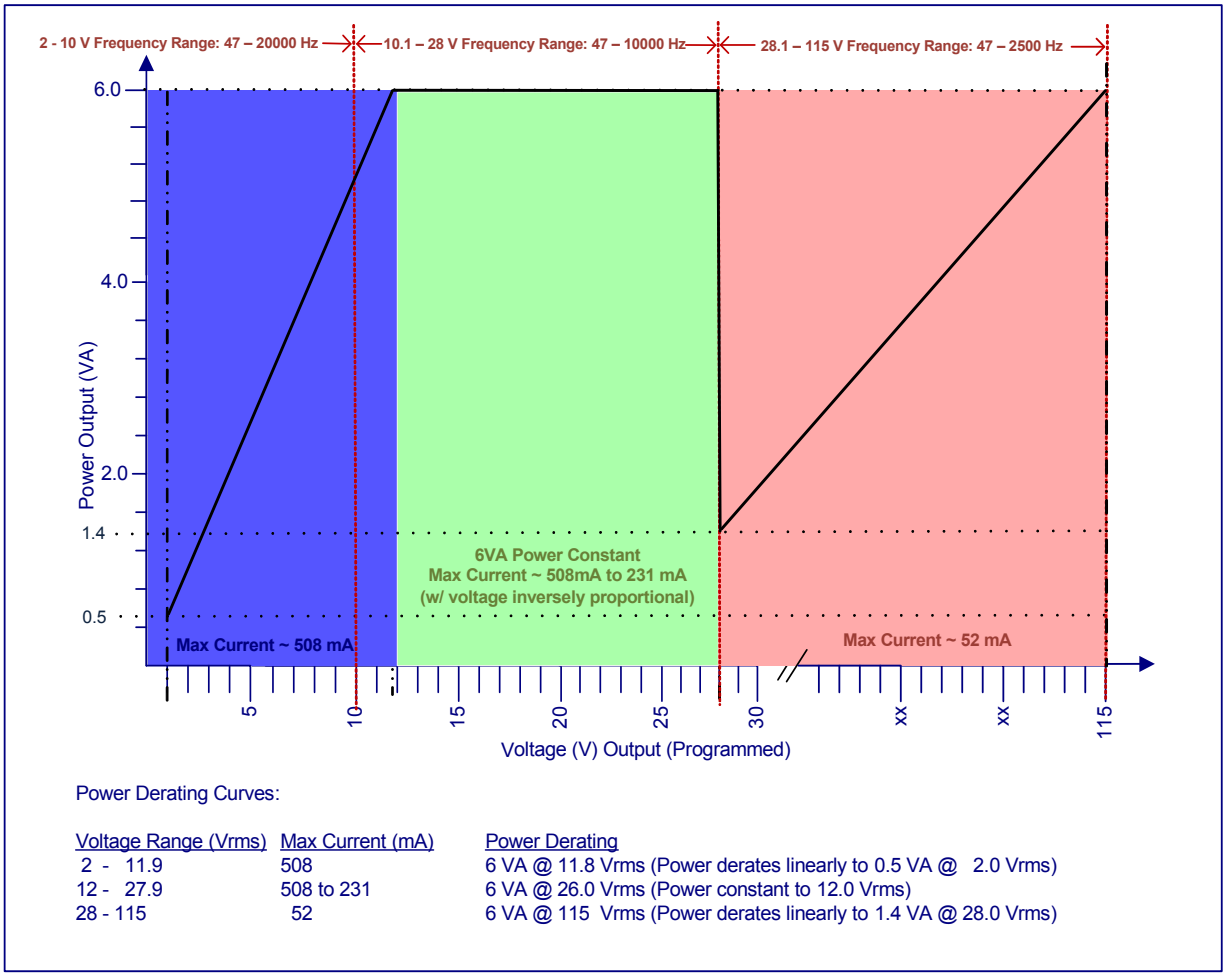
Input Signal (V_{L-L})	Input Impedance (kΩ)
1 to 3 V	47
3 to 6 V	55
6 to 11.8 V	58
11.8 to 26 V	60
26 to 90 V	200

Tracking Speed:	2.76 rps. At 60 Hz 4.68 rps. At 360 Hz or higher
Settling Time:	1.5 s max. for 180° step change (Based on Bandwidth selected) 3.0 s max. at 47-66 Hz (Based on Bandwidth selected)
Phase Correction:	Automatically corrects for up to a 60° phase shift between stator and rotor
Velocity or DC angle for Ch.1 & Ch.2:	±1000 °/sec = ±10 VDC ±100 °/sec = ±10 VDC 0 to 359.99°= 0 -10 VDC ±179.99° = ±10 VDC
Band width:	Automatically set based on frequency of input, up to a max of 100 Hz BW. User can change this parameter as desired, over a range of 6 to 1200 Hz BW.
Data averaging:	Selectable from 10 ms to 10 seconds
Converter Busy:	TTL compatible pulses, 1µs wide nom. Pulses present when tracking.
Digital Output:	6 decade BCD (1-2-4-8) 10 TTL loads
Serial Interfaces:	Ethernet, USB, and IEEE-488, and legacy 50 pin connector
Temperature Range:	0-50°C operating; 0-70°C storage
Input Power:	85 Vrms to 265 Vrms, 47 to 440 Hz, < 20 Watts
Weight:	4 lbs.
Dimensions:	12.5” L x 9.5” W x 3.5” H

REFERENCE GENERATOR SPECIFICATIONS (OPTIONAL, SEE PART NUMBER)

(Improved reference generator specifications updated and reflect instruments manufactured with date code (D/C 1001 or higher)

Voltage Output:	2 Vrms to 115 Vrms, Programmable with a resolution of 0.1 V • 2.0 to 10.0 Vrms / 47 Hz to 20 KHz frequency range • 10.1 to 28.0 Vrms / 47 Hz to 10 KHz frequency range • 28.1 to 115.0 Vrms / 47 Hz to 2.5 KHz frequency range
Accuracy (No Load):	±5% of setting < 15 KHz ±10% of setting ≥ 15 KHz
Regulation	±5% (No Load to Full Load)
Output Drive:	6 VA maximum (See detailed description of Output Drive)
Output Protection:	Over-current (10x automatic retry; @ 1.3 sec int.; afterwards, shutdown w/ manual reset)
Frequency:	47 Hz to 20 KHz Programmable with 0.1 Hz steps
Frequency accuracy:	The greater of ±0.1% of frequency programmed or ±1 Hz.
THD:	±3% (maximum)
Reference Output Drive:	Isolated, single output (See detailed characterization)



Power Derating Curves:

Voltage Range (Vrms)	Max Current (mA)	Power Derating
2 - 11.9	508	6 VA @ 11.8 Vrms (Power derates linearly to 0.5 VA @ 2.0 Vrms)
12 - 27.9	508 to 231	6 VA @ 26.0 Vrms (Power constant to 12.0 Vrms)
28 - 115	52	6 VA @ 115 Vrms (Power derates linearly to 1.4 VA @ 28.0 Vrms)

Above figure: Reference output drive detailed characterization

DETAILED ACCURACY SPECIFICATIONS

NOTE: SPECIFICATIONS APPLY AFTER A 15 MINUTE WARMUP AND CALIBRATION

Accuracy: 8810A		
Resolver mode: 2.0 to 28 V_{L-L}	±0.004°	from 47 Hz to 5 KHz
Resolver mode: 28 to 90 VL-L	±0.004°	from 47 Hz to 1 KHz
Resolver mode: 2.0 to 12 V_{L-L}	±0.004° to ±0.008°	from 5 KHz to 10 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.008° to ±0.015°	from 10 KHz to 15 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.015° to ±0.02°	from 15 KHz to 20 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.006°	from 47 Hz to 5 KHz
Resolver mode: 1.0 to 2.0 VL-L	±0.006° to ±0.015°	from 5 KHz to 10 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.015° to ±0.025°	from 10 KHz to 15 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.025° to ±0.035°	from 15 KHz to 20 KHz derated linearly
Synchro mode: 2.0 to 90 V_{L-L}	±0.004°	from 47 Hz to 1 KHz

Accuracy: 8810AH		
Resolver mode: 2.0 to 28 V_{L-L}	±0.0015°	from 47 Hz to 5 KHz
Resolver mode: 28 to 90 V_{L-L}	±0.002°	from 47 Hz to 1 KHz
Resolver mode: 2.0 to 12 V_{L-L}	±0.0015° to ±0.005°	from 5 KHz to 10 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.005° to ±0.01°	from 10 KHz to 15 KHz derated linearly
Resolver mode: 2.0 to 12 V_{L-L}	±0.010° to ±0.015°	from 15 KHz to 20 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.0025°	from 47Hz to 5 KHz
Resolver mode: 1.0 to 2.0 VL-L	±0.0025° to ±0.01°	from 5KHz to 10 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.010° to ±0.02°	from 10 KHz to 15 KHz derated linearly
Resolver mode: 1.0 to 2.0 VL-L	±0.02° to ±0.03°	from 15 KHz to 20 KHz derated linearly
Synchro mode: 2.0 to 28 V_{L-L}	±0.0015°	from 47 Hz to 1 KHz
Synchro mode: 28 to 90 V_{L-L}	±0.0025°	from 47 Hz to 1 KHz

CALIBRATION

When unit is turned on it will automatically initiate calibration. After warm-up of 15 minutes, unit will again automatically calibrate the channel or channels being used. Once calibrated, unit will monitor usage. For a comprehensive description of the calibration function, refer to the 8810A Operations Manual, Appendix “D”.

INTERFACES

The 8810A is available with several different interfaces for ATE applications. Interfaces include, Ethernet, USB, IEEE-488, and a legacy 50 pin connector for API parallel BCD outputs. The legacy 50 pin connector and the IEEE-488 are both 100% backwards compatible with the model 8810. Below is information, for each interface. Detail programming commands / information are included in **"8810A Programmer's Reference Guide."** The Ethernet connector and the USB connector, J3, are industry standard connections.

J1 CONNECTOR, API PARALLEL PIN DESIGNATIONS

DD50P, Mate DD50S or equivalent

Pin	Designation	Pin	Designation	Pin	Designation	Pin	Designation	Pin	Designation
1	**Do Not Use**[1]	11	Converter busy	21	S1 Ch. 2	31	0.4º	41	DC out Ch.1[2]
2	**Do Not Use**[1]	12	0.04º	22	S2 Ch. 2	32	2 deg. (BCD)	42	Data Freeze
3	Chassis ground	13	0.01º	23	S3 Ch. 2	33	8 deg. (BCD)	43	Remote Ch. select
4	Digital ground	14	0.8º	24	S4 Ch. 2	34	Do Not Use	44	0.004º or 0.005º for
5	S1 Ch. 1	15	0.2º	25	R1 Ch.2 Ref Hi	35	Do Not Use	45	20 deg. (BCD)
6	S2 Ch. 1	16	4º	26	R2 Ch. 2 Ref LO	36	Reference Out Hi	46	40 deg. (BCD)
7	S3 Ch. 1	17	1º	27	Not Data Freeze	37	Reference Out Lo	47	80 deg. (BCD)
8	S4 Ch. 1	18	Do Not Use	28	0.02º	38	0.008º	48	10 deg. (BCD)
9	R1 Ch. 1 Ref HI	19	DC out Ch.2[2]	29	0.08º	39	0.002 º	49	100 deg. (BCD)
10	R2 Ch. 1 Ref LO	20	Local/Rem select	30	0.1º	40	0.001º or 0.005º for 179.99º	50	200º or + bit for 179.9º

Notes:

1- Previous models allowed power input at pins 1 & 2. To meet new safety requirements, power input is ONLY via the Power Entry module.

2- DC outputs on pins 19 & 41 are referenced to pin 4, digital ground.

J2 CONNECTOR, IEEE - 488 PIN DESIGNATIONS

Standard IEEE Interface Connector

Pin	Designation	Pin	Designation
1	DIO1	13	DIO5
2	DIO2	14	DIO6
3	DIO3	15	DIO7
4	DIO4	16	DIO8
5	EOI	17	REN
6	DAV	18	Gnd., DAV
7	NRFD	19	Gnd., NRFD
8	NDAC	20	Gnd., NDAC
9	IFC	21	Gnd., IFC
10	SRQ	22	Gnd., SRQ
11	ATN	23	Gnd., ATN
12	Shield	24	Gnd., Logic

J3 CONNECTOR:

- USB-B (USB 2.0) Rear Connector, for communications only
- Ethernet (10/100/1000 Base-T copper)

ORDERING INFORMATION

PART NUMBERS

8810A- * Standard accuracy ±0.004° (See Detail Accuracy Specifications)
└ Add "R" for an internal programmable 6 VA Reference Generator

8810AH- * Optional high accuracy unit ±0.0015° (See Detail Accuracy Specifications)
└ Add "R" for an internal programmable 6 VA Reference Generator

NOTE: The 8810A (all models) are | compliant

ACCESSORIES

Included with the 8810A is an accessory kit NAI part number 8810A-ACCESSORY-KIT.
Kit includes the following items:

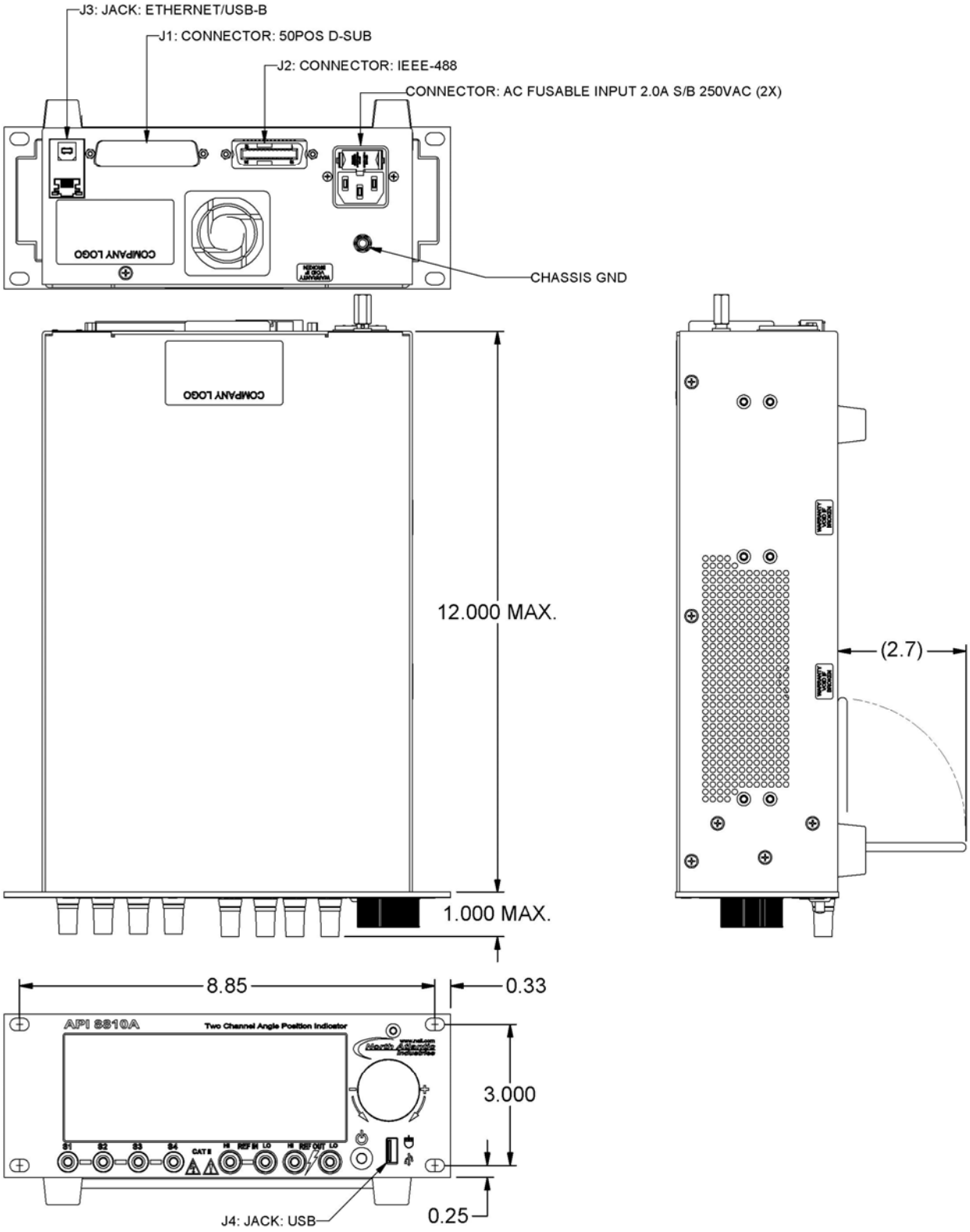
Description	NAI P/N
50 Pin Mating connector for J1	05-0053
Fuse, 5 x 20mm, 2A, slo-blo (2)	99-0146
Line Cord	202-0002

Optional Mounting Accessories

The 8810A can be ordered with mounting adapters for mounting either one or two units in a standard 19-inch equipment rack. The table below describes full rack and tandem full rack mounting accessories.

Type of Mount	Description	NAI P/N
Full Rack Mounting	Mounts one unit in 19-inch rack	783893
Tandem Full Rack Mounting ½ height	Mounts two units side by side in 19-inch rack (3-1/2" rack height)	548557

MECHANICAL OUTLINE, MODEL 8810A



Note: J3 USB-B Rear Connector for communications only (USB 2.0).
J4 USB-A Front Panel Connector for optical mouse only.

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REVISION HISTORY

Revision	Description of Change	Engineer	Date
A	Preliminary Release	FH / as	05 DEC 05
A1	Preliminary Re-release	FH / as	06 JAN 06
B	Initial Release	AS	10 FEB 06
C	Corrected discrepancies (Resolution / accuracy) with operations manual	FR	30 JUN 06
D	Restated accuracy specifications pg 1 & pg 3, changed operating temp. to 50 deg C max. added high accuracy P/N 8810AH	FR	18 JUL 06
E	Updated all screen shots to latest actual units, added additional connector interface information, added Mechanical outline drawing, modified Title of document, changed file name from “8810A-B001 revX” to from “8810A-A001 revX” for consistency.	FR	07 AUG 06
F	Corrected Tilt stand information (standard, not optional)	FR	08/11/06
F1	Deleted mouse as a purchase option, changed Ref. Generator output to 1.2VA	FR	08/22/06
F2	New Address	KL	04/25/07
F3	Edited accuracy specifications pg 1& 3, changed Band Width statement pg.3, added page after “SPECIFICATIONS” with Accuracy Tables for “A” & “AH” models & added CALIBRATION statement. Edited Part numbers re: accuracy. Changed power output rating for Optional reference from 1.2 VA to 2.2 VA on pgs 1, 3 & 6.	FR	09/27/07
F4	Added **|** compliant statement to page 1 & 6.	FR	10/09/07
F5	Corrected minor typo. errors pages 1,3 & 4, added note re: Reference Output Drive details.	FR	10/11/07
G	Added REF frequency characterization for voltage output, changed max REF harmonic content from 1% to 2% (Reference Generator Specifications pg.3).	AS	11/07/07
H	Updated 3 screen shots on page 2 (Dual Ch., Int. Ref. & Loc./Remote). Updated “Mechanical Outline” drawing on pg. 7.	FR	01/02/08
H1	Added Input Impedance table	FR	06/9/08
H2	Reformatted Document, revised Bandwidth spec, added note to J1 connector table	FR	06/26/08
H3	Added storage temperature spec	FH	03/02/10
J	Updated with improved optional reference generator specifications (applies to units manufactured with D/C 1001 or higher)	AS	10/06/10
K	Clarified Reference Generator frequency accuracy specification (pg.4) (From: 0.1% FS To: The greater of 0.1% of frequency programmed or 1 Hz.)	AS	03/24/11
L	Changed Reference Generator voltage accuracy specifications	RS	01/16/13

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