

# Thermo Scientific Orion 2111LL Low Level Sodium Analyzer

Accurate, ultra low level sodium measurement

Protect your turbine with sodium measurements made simple. Our ultra low level sodium analyzer delivers accuracy and reliability with years of proven performance.



#### Markets:

- Power
- Semiconductor
- Chemical-Petrochemical
- Pulp and Paper

#### Applications:

- Ultra Pure Water Analysis
- Demineralized Water / RO
- Boiler Feedwater
- Drum Boilers
- Steam Condensate / CDP



As the need for ultra pure water production advances, the power industry looks to the most trusted sodium analyzer to keep pace. The Thermo Scientific™ Orion™ 2111LL low level sodium analyzer exceeds the demands of high purity water measurements by providing ultra low level detection to 0.001 ppb for trace detection in high purity water and steam generation.

The fast response of the Orion 2111LL sodium analyzer protects your turbine against destructive sodium levels with precise, real-time indication of sodium contaminants, allowing you to increase efficiency, prevent corrosive deposits and maximize uptime.

Trust your results – the Orion 2111LL provides stable and drift-free measurements using Thermo Scientific™ Orion™ ROSS Ultra™ ion selective electrode (ISE) technology. Choose the global leader in sodium ISE technology for maximum results every time.

Save time and money by ordering reagent kits, which are available in pre-packaged bottles for safe and convenient replacement.

#### Advantages:

- Rapid response to ultra low level changes in sodium levels, including real time notification and protection from costly feedwater breakthrough and steam carryover
- Superior stability of ROSS Ultra electrode technology enables high performance and accuracy without the need for frequent calibrations
- Reduces hazardous waste disposal costs with complete DIPA reagent consumption
- Simple to operate and calibrate – the easy to read, step-by-step calibration process ensures a successful calibration the first time and every time

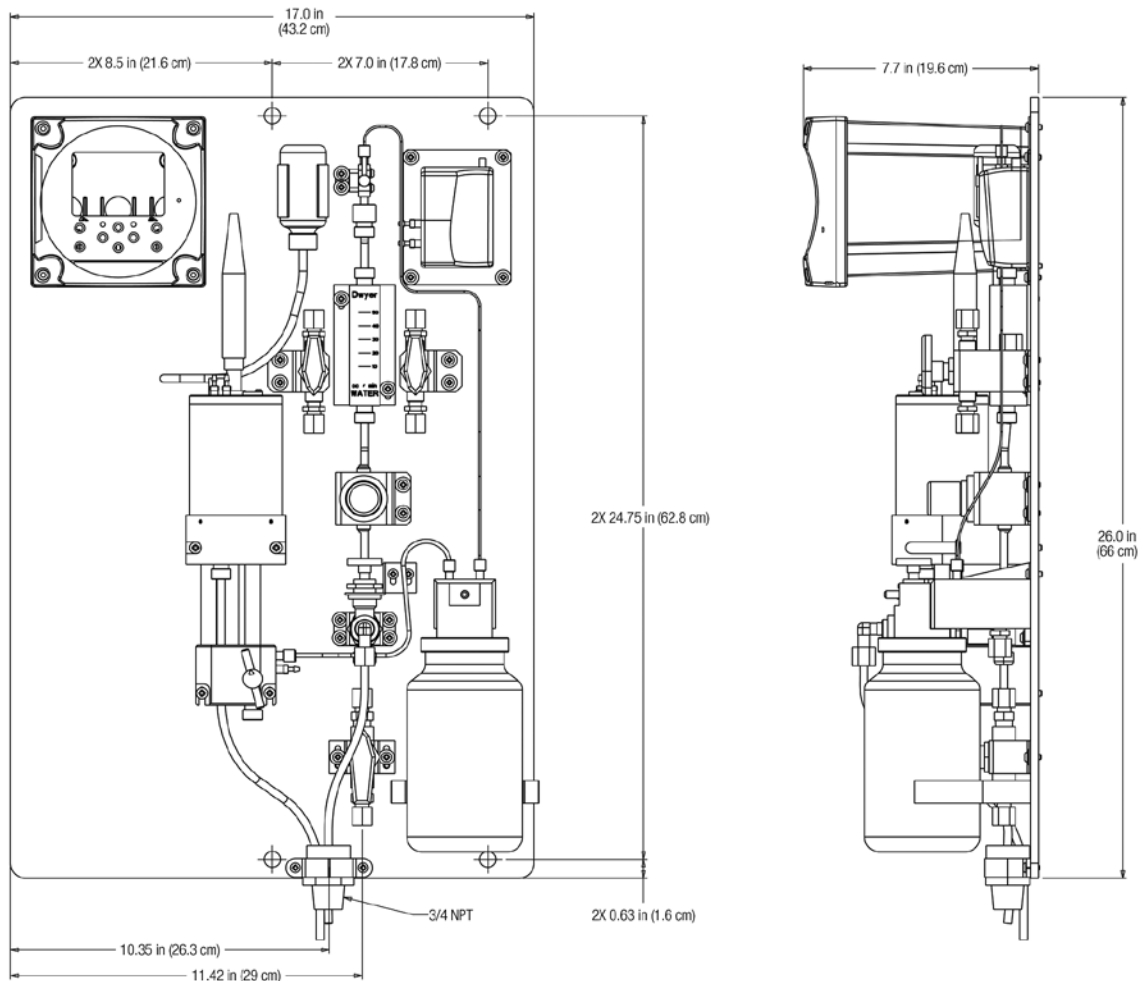
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## Product Benefits

- Ultra low level sodium detection to 10 parts per trillion with high accuracy and precision
- Protect against the costly effects of corrosion with sensitive, selective, reliable and verifiable measurements that provide early warning detection of sodium
- Extremely easy to use while maximizing uptime – simple step-by-step scrolling instruction for setup, calibration, operation and diagnostics menus
- Measurements at a glance from any distance for even the lowest light conditions using the large operator friendly backlit display
- Fastest and most stable measurements, limiting unnecessary calibration cycles due to drift – utilize the superior ROSS Ultra sodium electrode technology
- Minimize operator time and maintenance without the use of complicated moving parts or pumps that often require frequent attention and expensive spare part expenditures
- Extend reagent consumption up to 3 months while reducing costly waste disposal fees – simple reagent addition design conditions the sample pH for optimal sodium electrode performance while suppressing interfering ions
- Advanced user interface with detailed calibration, measurement and diagnostic logs for early diagnostic and action level notification; configurable for your desired level of performance – all password protected if preferred
- Simple and fast calibration cycles using double known addition – quickly have your system back online with security and confidence
- Expandable modules for grab sample and low level verification to meet the strictest guidelines for QA/QC validation programs
- Easy installation has your plant up and running in minutes – Orion 2111LL is retrofittable to the Thermo Scientific Orion 1811EL panel mounting footprint

## Dimensions

Orion 2111LL installation dimensions shown without optional protective enclosure.



## Product Specifications

Specific Ion Measurements	Range: 0.001 ppb to 10 ppm	Physical Size	Electronics: 144 x 144 x 186 mm
	Resolution: 2, 3 or 4 digits		Entire system: 65 x 45 x 27 cm (26" x 17" x 11")
	Accuracy (with DKA cal): $\pm 5\%$ or 0.01 ppb		Fits on Orion 1811EL panel mounting footprint
	Reagent: Diisopropylamine (DIPA)		
Response Time	With freshly etched electrode, during calibration: Reach 95 % of final reading within 2 minutes of injecting a standard solution	Weight	22.7 kg (50 lb)
Units Displayed	ppb, ppm (auto ranging), mV, temperature	Power	Input: 85-132 or 170-264 V AC
mV Measurement	Range: $\pm 1999.9$ mV	Software Features	Self-test and diagnostics: YES
	Resolution: 0.1 mV		Real time clock: YES
	Relative accuracy: $\pm (0.5 \text{ mV} + 0.1 \%)$		Meter serial number: YES
Temperature Measurement	Range: - 10 to 120 °C		Password protection: YES
	Resolution: 0.1 °C	Reset function: YES	Startup reset: YES
	Relative accuracy: $\pm 0.5\%$ °C	Hardware calibration function: YES	Non-volatile memory: YES
	Continuous temperature readings: YES	Meter Features	Battery backup: YES
	ATC probe connection detection: YES		Expansion bus: Serial communication and power
Specific Ion Calibrations	DKA calibration: YES	Electronics	Waterproof enclosure: IP66 and NEMA 4X
	DKA calibration points: 3 points	Regulatory and Safety	CE, CSA, FCC Class A limits
	Off-line calibration: YES		Ambient operating temperature: 5 to 45 °C
	Off-line calibration points: 1 point	Environmental Operating Conditions	Relative humidity: 5 to 95 % non-condensing
	Pre-programmed standard values: YES		Storage temperature: - 20 to 60 °C
Custom programmed standard values: YES	Storage humidity: 5 % to 95 %, non-condensing		
Sample Conditions	Temperature: 5 to 45 °C	Case Material	Valox 364
	Total acidity: Less than 50 ppm $\text{CaCO}_3$	Shock and Vibration	Vibration, shipping/handling: 0 - 60 Hz @ 1 G Load
	Inlet pressure: 8 to 100 psig		Shock, drop test in packaging: 36" on all sides and corners
	Flow rate: 40 mL/min nominal set by pressure regulator		
	Sample inlet: ¼" NPTF tube fitting		
Sample drain: ¾" NPT male			
Grab sampler supported: YES			
Display	Custom backlit LCD with temperature, concentration, mV, error codes and menu driven prompts		
Inputs	ATC: 2 x NTC 30K		
	Specific ion input and reference: Potentiometric		
Outputs	Analog output: Galvanically isolated		
	Number of analog outputs: 2, one dedicated to sodium, one to temperature; shared ground		
	Output selections: 0 - 20 mA or 4 - 20 mA		
	Programmable range: YES		
	Log and linear output options: YES, user selectable		
	Alarm outputs: 3		
	Number of relay outputs: 3		
	Maximum relay load: 250 V AC, 5 A, 30 V DC		
	Minimum value alarm: YES		
	Maximum value alarm: YES		
Error alarm: YES			
Calibration/offline alarm: YES			
Programmable min/max values: YES			

## Orion 2111LL Low Level Sodium Analyzer

**Global support** — with experience that comes from supporting our customers for over 35 years throughout the world, our water quality specialists and customer support teams offer a quick, thorough and professional response to any problem encountered.

**Focus on user benefits** — we work closely with you to define your needs, and ensure you are using the analyzer in a way that improves your bottom line. For more information, contact your local water quality specialists, call 1-800-225-1480 or visit [www.thermoscientific.com/processwater](http://www.thermoscientific.com/processwater).

## Cat. No. Low Level Sodium Analyzer Packages

2111LLEN	<b>Low Level Sodium Analyzer With Protective Enclosure Package</b> — includes low level sodium analyzer with protective enclosure, ROSS sodium electrode (210048), ROSS Ultra reference electrode (210058), ATC probe (2100TP), standard solutions kit (181140), CD user guide and options kit
2111LLENG	<b>Low Level Sodium Analyzer With Protective Enclosure Package</b> — includes low level sodium analyzer with protective enclosure and integral grab sampler, ROSS sodium electrode (210048), ROSS Ultra reference electrode (210058), ATC probe (2100TP), standard solutions kit (181140), CD user guide and options kit
2111LL	<b>Low Level Sodium Analyzer Only Package</b> — includes low level sodium analyzer, ROSS sodium electrode (210048), ROSS Ultra reference electrode (210058), ATC probe (2100TP), standard solutions kit (181140), CD user guide and options kit
2111LLG	<b>Low Level Sodium Analyzer Only Package</b> — includes low level sodium analyzer and integral grab sampler, ROSS sodium electrode (210048), ROSS Ultra reference electrode (210058), ATC probe (2100TP), standard solutions kit (181140), CD user guide and options kit

## Cat. No. Reagent Packages and Accessories

211192	<b>Low Level Sodium Consumables Kit</b> — for one year operation, includes (6) x empty bottles for use with diisopropylamine (DIPA) reagent with (6) diffusion tubing kits (211194), reagent bottle adapter, (1) standard solutions kit with 19.1 ppm and 192 ppm Na <sup>+</sup> standards and etch solution, (1) sodium electrode, (1) reference electrode, (5) x 2 oz bottles reference filling solution, (1) O-ring kit, (1) check valve, (1) set of 100 pipette tips, (1) restriction tube assembly, (2) x 60 micron inlet filters and (1) filter gasket
211190	<b>Diisopropylamine Reagent</b> — for 60 days operation, includes (1) x 0.8 L bottle DIPA reagent and (1) diffusion tubing kit (211194)
211190FOR	<b>Reagent-less Diisopropylamine Reagent</b> - (1) x 0.8 L empty bottle for use with DIPA reagent and (1) diffusion tubing kit (211194)
211191	<b>Diisopropylamine Reagent</b> — for one year operation, includes (6) x 0.8 L bottle DIPA reagent and (6) diffusion tubing kits (211194)
211191FOR	<b>Reagent-less Diisopropylamine Reagent</b> - (6) x 0.8 L empty bottles for use with DIPA reagent and (6) diffusion tubing kits (211194)
211193	<b>Diisopropylamine Reagent</b> — for 60 days of operation, includes (1) x 8 inch diffusion tubing assemblies with O-rings for use with DIPA reagent
211194	<b>Diffusion Tubing Kit</b> — (1) x 4 inch diffusion tubing assembly with O-rings
211196	<b>Diisopropylamine Reagent</b> — for one year operation, includes (6) x 8 inch diffusion tubing assemblies with O-rings for use with DIPA reagent
211198	<b>Diffusion Tubing Kit</b> — (1) x 8 inch diffusion tubing assembly with O-rings
181148	<b>Calibration Kit with Carrying Case</b> — includes 0.1 mL pipette, box of pipette tips, wash bottle, (1) x 2 oz bottle standard 1 (19.1 ppm Na <sup>+</sup> ), (1) x 2 oz bottle standard 2 (192 ppm Na <sup>+</sup> ) and (1) x 2 oz bottle of etch solution (181113)
181140	<b>Sodium Standard Solutions Kit</b> — includes (2) x 2 oz bottles of standard 1 (19.1 ppm Na <sup>+</sup> ), (2) x 2 oz bottles of standard 2 (192 ppm Na <sup>+</sup> ) and (1) x 2 oz bottle of etch solution (181113)
181141	<b>High Level Sodium Standard Solutions Kit</b> — includes (2) x 2 oz bottles of standard 1 (1910 ppm Na <sup>+</sup> ), (2) x 2 oz bottles of standard 2 (19200 ppm Na <sup>+</sup> ) and (1) x 2 oz bottle of etch solution (181113)
181113	<b>Sodium Electrode Etch Solution</b> — (1) x 2 oz. bottle
210048	<b>Thermo Scientific Orion ROSS Sodium Electrode</b> — for use with 2111LL

## Cat. No. Reagent Packages and Accessories (continued)

210058	<b>ROSS Ultra Reference Electrode</b> — for use with 2111LL, includes (1) x 2 oz bottle reference filling solution (211172)
211172	<b>Reference Electrode Filling Solution</b> — (5) x 2 oz bottles, for use with 210058 reference electrode
2111EK	<b>Electrode Kit</b> — includes (1) sodium electrode (210048), (1) reference electrode (210058) and (1) x 2 oz bottle reference filling solution (211172)
2100EC	<b>Electrode Cables</b> — (2) x 1 meter cables for 210048 and 210058 electrodes
21003M	<b>Extension Cables</b> — (2) x 3 meter cables for 210048 and 210058 electrodes
2100TP	<b>2100 Series Automatic Temperature Probe</b> — with ground (30 kΩ)
2001XT	<b>2100 Series Automatic Temperature Probe</b> — with 10 meter extension cable and ground (30 kΩ)

## Cat. No. Field Replaceable Units - Refer to user guide for complete list

21GRABLL	Grab Sampler Retrofit Kit- includes sample bottle assembly and valve assembly
2100EN	2100 series enclosure
2111FP	Fluidics panel assembly only
2111LLEP	2111LL electronics faceplate
2100BV	Needle valve assembly
2111RG	Regulator assembly
2111FM	Flow meter assembly
2111SV	Calibration shutoff valve assembly
2111RT	Restrictor tube assembly
2100DRBA	Reagent bottle adapter assembly for use with DIPA reagent bottle
2100RF	Reagent fittings to mate the reagent bottle adapter to the diffusion tube assembly
2111NT	Inlet tube assembly
2111PA	Air pump assembly
2100AF	Air filter
2111VC	Check valve
2100PS	Power supply assembly
2111FC	Flow cell assembly
2111LLOK	O-ring kit
181170	(2) Inlet sample filters
2111MK	Maintenance Kit— includes (2) electrode cables, (1) diffusion tubing kit, (1) sample filter, (1) O-ring kit, (1) check valve, (1) sensing tube, (1) shut off valve, (1) restrictor tubing assembly, (1) air filter, (1) inlet tubing assembly and (1) reagent bottle cap and adapter
2111LSK	Service Kit— includes (1) electronics faceplate (2111LEP), (1) air pump assembly (2111PA), (1) regulator assembly (2111RG), (2) electrode cable with gland assemblies for sensing and reference electrodes, (1) power supply assembly (2100PS) and (1) fuse kit assembly (2100FK115 and 2100FK230)

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