LAUDA noah

point-of-use temperature control systems for the semiconductor industry

point-of-use (POU) temperature control systems

the LAUDA-Noah POU strategy...

The benefits of LAUDA-Noah POU temperature control systems:

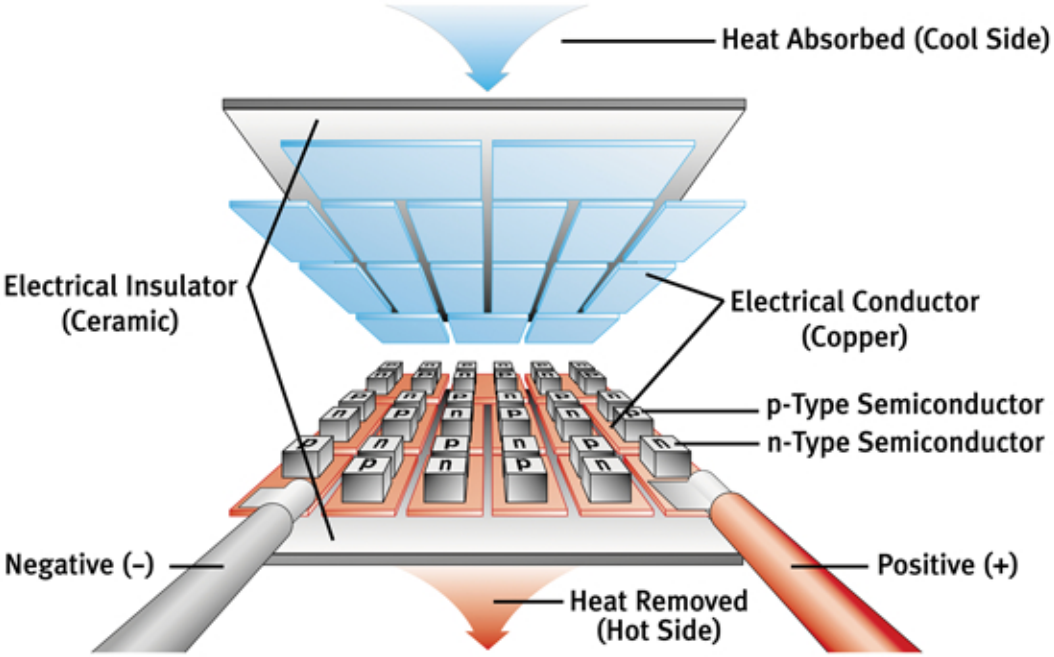
- dynamic temperature control
- smallest footprint in the industry enables POU installations
- low power consumption
- sub-floor tile mount capability
- zero temperature drift
- reliable solid-state operation – only one moving part
- multi-platform interfacing capability
- only 1 gallon of coolant required

Over 25 years ago, Noah Precision pioneered the integration of thermoelectric devices into temperature control systems for use in critical semiconductor wafer processing applications.

Shrinking device geometries and new, more demanding processes require fast and accurate temperature control. LAUDA-Noah is the leading provider of temperature control systems for advanced devices with reduced operating costs and improved reliability.

thermoelectric (TE) overview

LAUDA-Noah POU thermoelectric temperature control systems are based on the proven and well-known principles of heat transfer used in Peltier devices. These devices are solid-state heat pumps that provide the ability to rapidly change temperature of a surface.



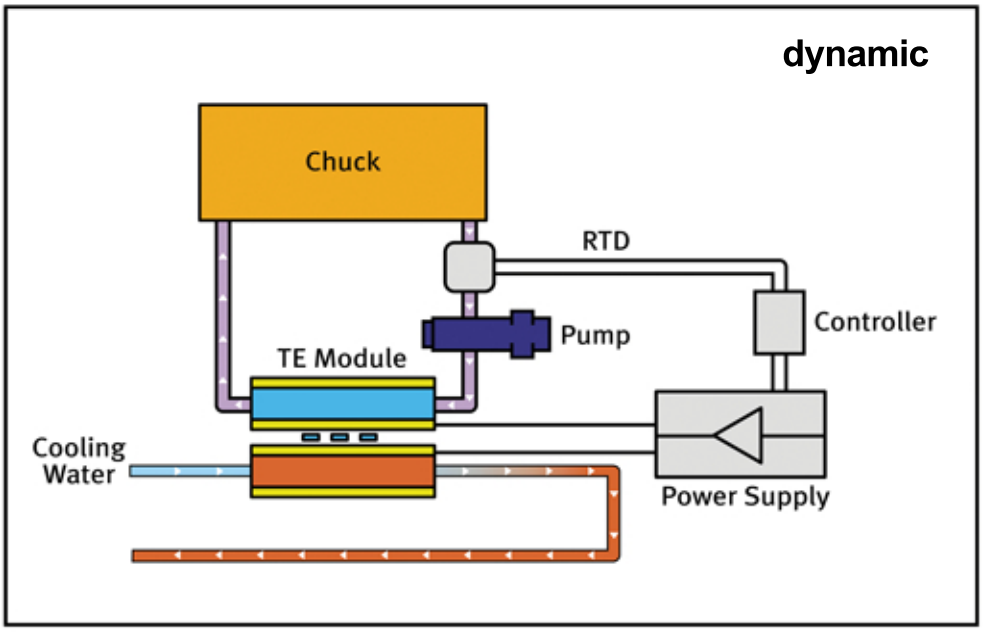
Peltier Effect Device

- small & stable
- no moving parts
- no noise
- temperature control within 0.1° C
- no CFCs

dynamic vs. static temperature control

LAUDA-Noah's dynamic control POU systems improve through-the-lot & chamber-to-chamber wafer processing uniformity.

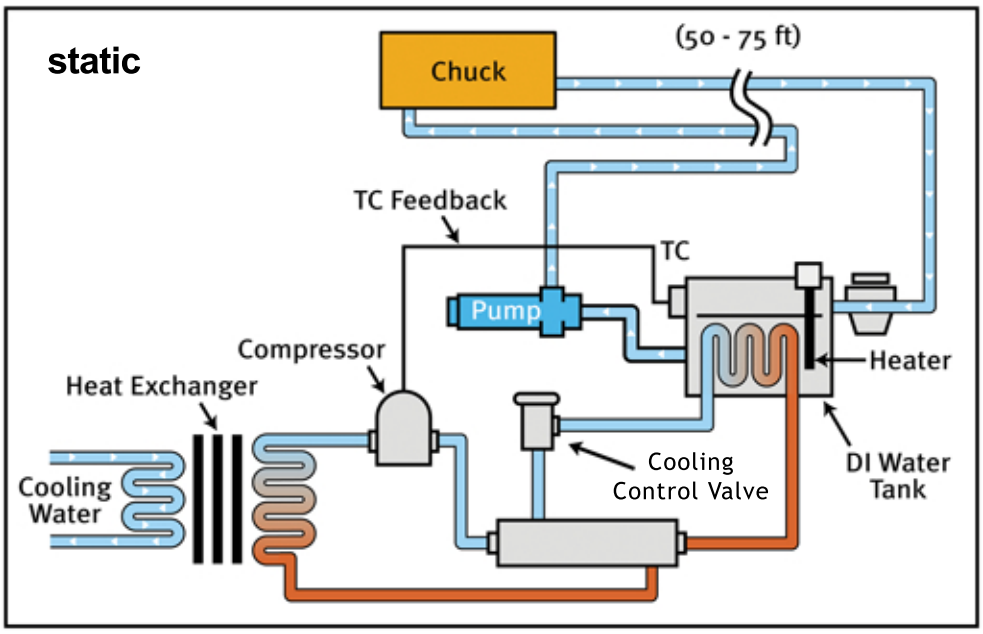
This is accomplished by sensing the temperature of the fluid returned from the chamber and varying the temperature of the fluid supplied to the chamber to compensate for changing process



- dynamic temperature control at the point-of-use
- rapid ramp rates = greater chamber productivity
- compressor-free POU system consumes ~50% less power
- entire system has one (1) moving part = high reliability
- use of perfluorinated fluids = no filters or DI components required
- zero footprint capability with sub-floor mount
- modular system design = simplified troubleshooting and fast MTTR

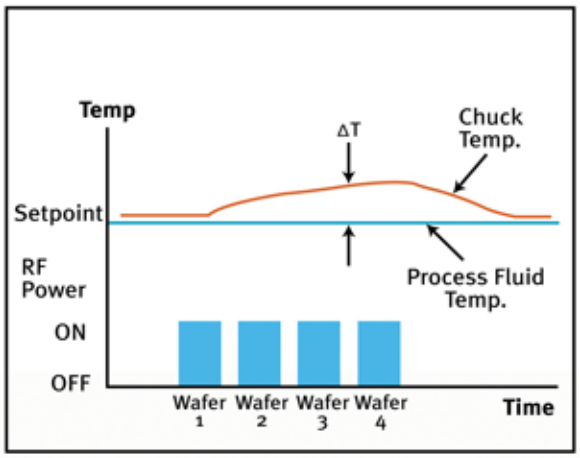
Static units maintain the temperature setpoint in the reservoir by cycling heaters and cooling control valves on & off, thus consuming about 50% more power than a LAUDA-Noah POU system. The fluid is pumped to the chamber from the static unit's remote location. This can result in large ambient losses that will tend to vary from chamber-to-chamber, depending upon hose length, hose type and routing, air flow, and ambient conditions.

The **wafer chuck** will eventually reach a new equilibrium temperature since the static unit is not designed to compensate for changing process conditions.

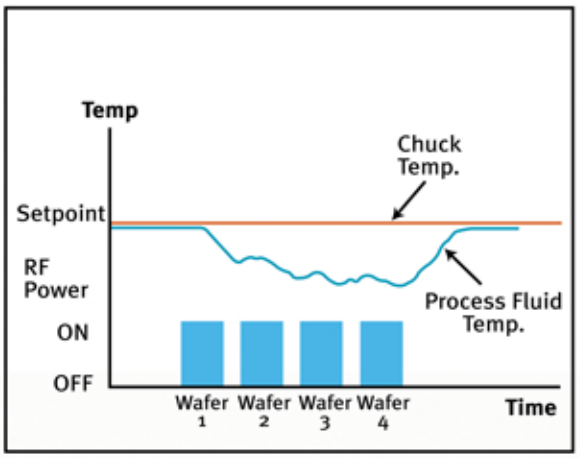


- large footprint consumes valuable fab tool space
- static temperature control typically in remote location adds cost – decreases efficiency
- compressors & large pumps require frequent maintenance
- compressor-based systems have higher power consumption

static



dynamic

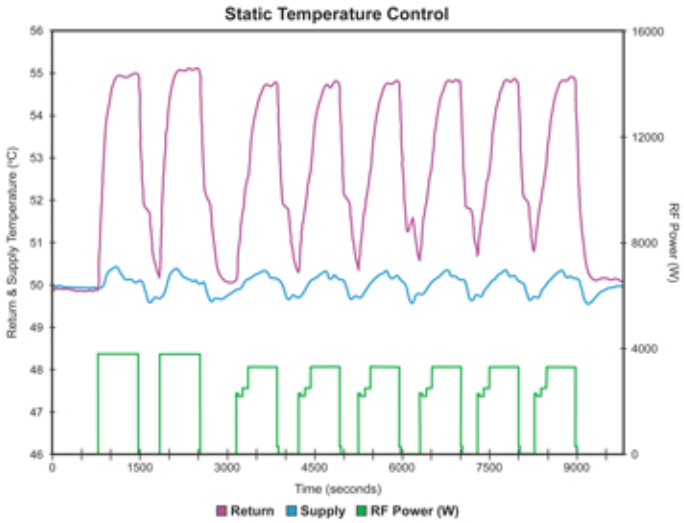


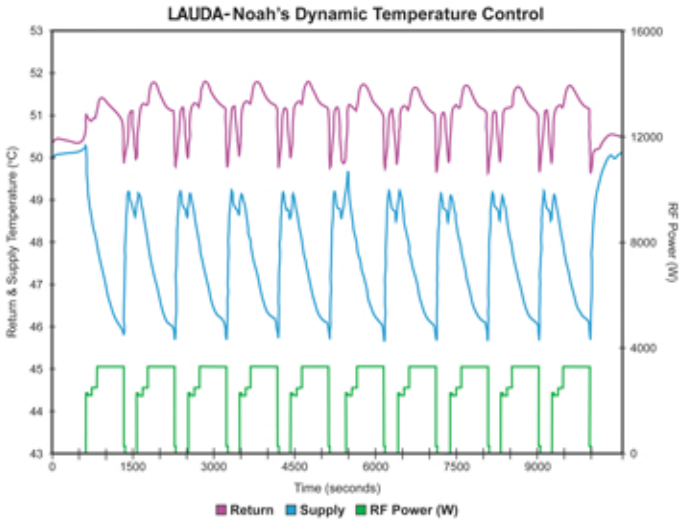
temperature drift

- negative effect on side wall passivation
- wafer-to-wafer temperature instability
- reservoir fluid temperature constant
- chuck temperature varies
- unstable etch rates

improved control

- fluid supplied temperature varies
- chuck temperature constant
- reduced 'First Wafer Effect'
- wafer-to-wafer stability
- improved CD bias
- stable etch profile

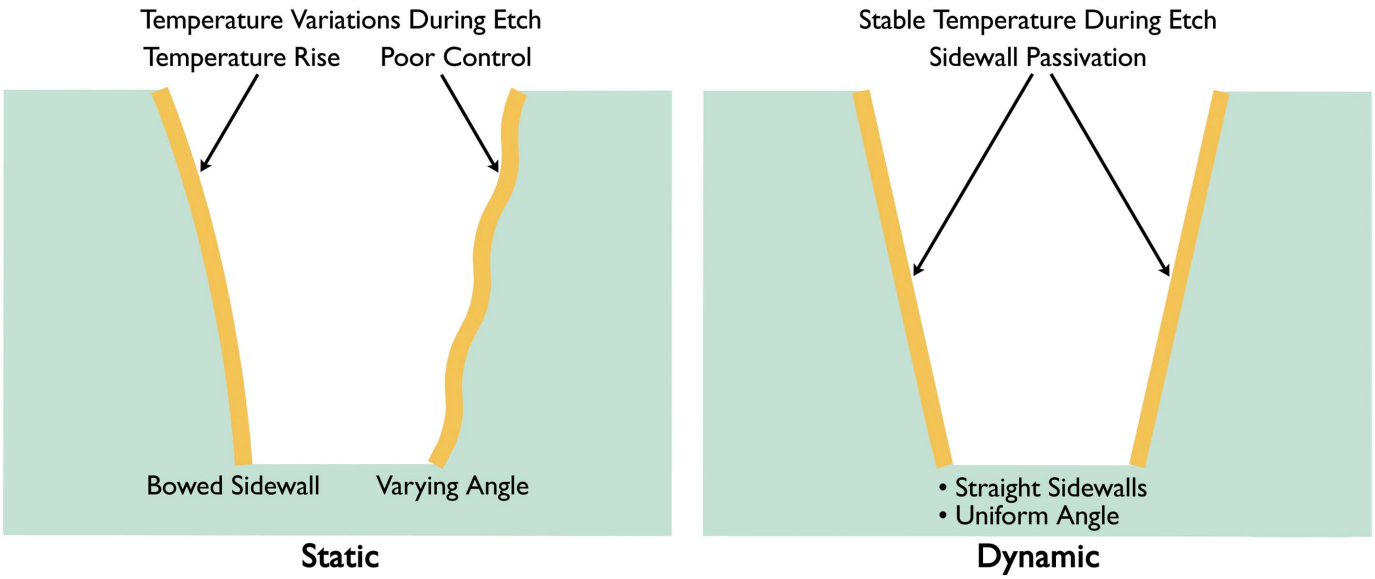




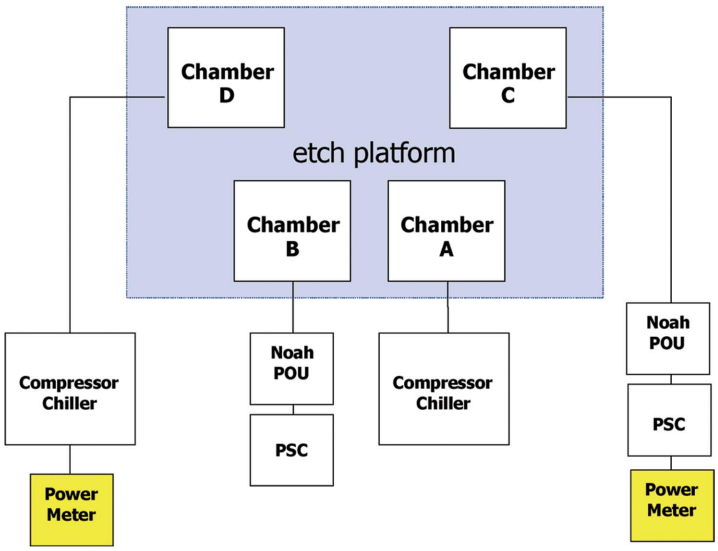
The 300mm chamber temperature profile comparison above illustrates the performance of LAUDA-Noah's dynamic POU system vs. a static unit on an etch process. Perhaps the most compelling aspects of this data set are the temperature uniformity and rapid response times accomplished under these extremely high RF power conditions.

Today's processes demand state-of-the art temperature control. LAUDA-Noah's dynamic POU systems are field-proven, providing unparalleled performance and efficiency as demonstrated above.

etch profile control



POU power consumption - "a compressor-free system"

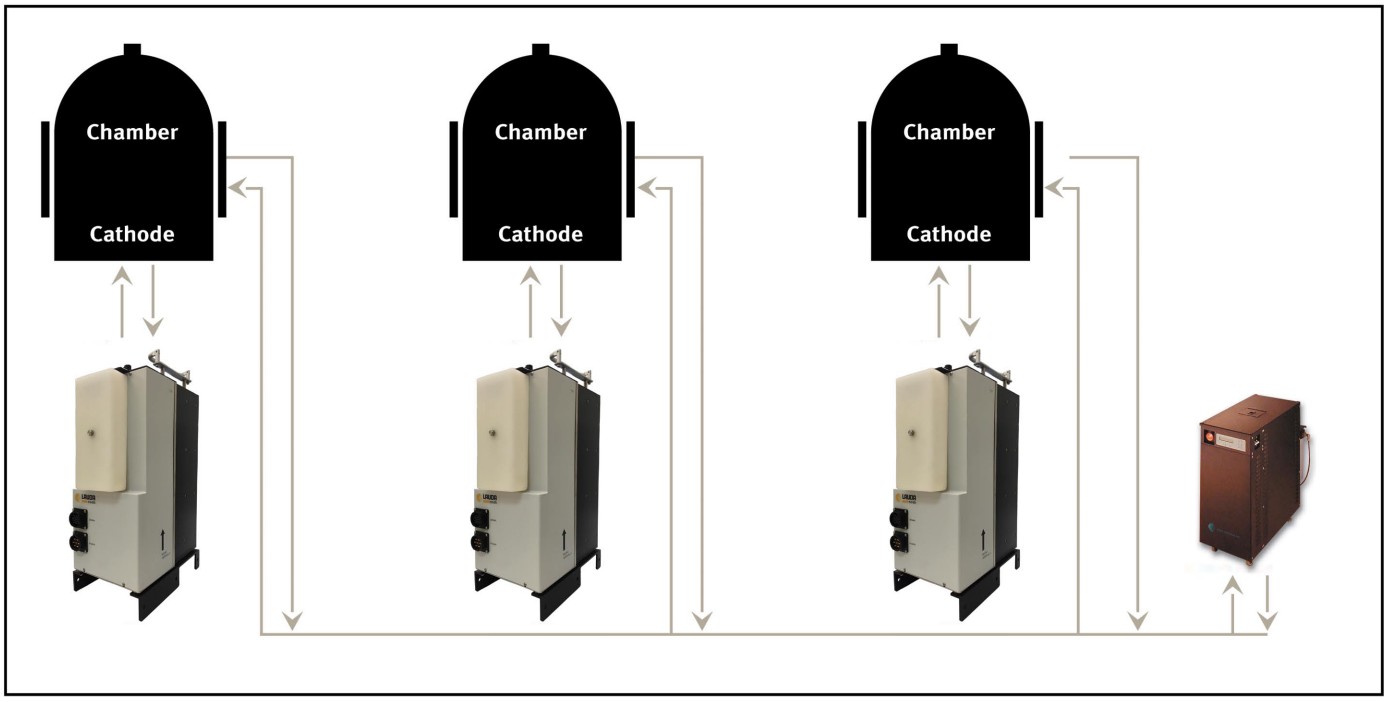


By design, the LAUDA-Noah TE device only consumes power while under a load. This results in a reduction of power consumed, as evidenced by this field data.

Similar comparative field data averages 50% less power consumed in most etch applications.

	POU	Compressor
Total Wafers	1791	1450
Total Power (kWh)	532	1531
kWh/wafer	**0.30**	**1.06**

independent temperature control



This figure illustrates a typical multi-chamber tool configuration. Each chamber has one dynamic POU module providing independent temperature control for the cathode / wafer chuck. Chamber wall temperature control is also an option with the LAUDA-Noah POU system, however, typical installations (shown above) can use one model 2015 Heat Exchanger to control the temperature of up to three chamber walls in parallel. This configuration provides excellent temperature stability in a more cost effective configuration.

NOTE: All LAUDA-Noah temperature control systems are "compressor-free"

POU specifications

Model	3300 POU	3500 POU	PSC*
temperature range	- 15 °C to 90 °C	-20 °C to 90 °C	-
cooling capacity	1200W @ 20 °C	2400W @ 20 °C	-
process cooling fluid flow	4 GPM @ 30 psig	4 GPM @ 30 psig	-
electrical requirements	-	-	**208 VAC, 50-60 Hz, 30A 3P**
dimensions (cm – H x W x D)	56 x 11.56 x 30	54.4 x 19.4 x 30	8.89 x 48.26 x 64.77
weight	25 kg (55 lbs)	38 kg (84 lbs)	20 kg (44 lbs)

* power supply controller

LAUDA-Noah, LP
Phone: +1 (360) 993 1395
Fax: +1 (360) 993 1399
2501 SE Columbia Way, Suite 140
Vancouver, WA 98661

www.lauda-noah.com
info@lauda-noah.com