INFICON

Making Excellence Repeatable

IC6

Thin Film Deposition Controller for Optical Applications

Feature-rich IC6 Provides the Best Measurement Precision Possible

The IC6 Thin Film Deposition Controller provides exceptional value by combining the proven performance of INFICON thin film controllers with unique features, all designed for you to achieve the most from your deposition process. The IC6 uses our ModeLock frequency measurement system to provide stable, high-resolution rate and thickness measurement with an industry-leading rate resolution of .00433 Å/s every $^{1}/_{10}$ second. Optical processes, such as reflective coatings, band-pass filters, and AR coatings benefit from high resolution and reliability along with the ability to accommodate 50 processes of 200 layers each. No other quartz crystal controller has the performance, quality, and features of the IC6, allowing you to make excellence repeatable.

FEATURES AT A GLANCE

- INFICON ModeLock technology ensures the most stable, highest resolution rate and thickness measurement available, even at very low rates
- Auto-Z improves thickness accuracy by automatically determining the Z-Ratio as material is deposited
- Co-deposition of up to six sources simultaneously
- Color TFT LCD display makes it easy to see what's going on with your process
- +/-0.0035 Hz over 100ms sample
- USB data storage for screen shots, recipe storage and data logging
- Powerful I/O with flexibility to integrate into simple or complex systems (using expandable Inputs (28) and Outputs (24 Relays, 14 TTL outputs), and use of logic functions (100 logic statements)
- Six DAC outputs standard, six additional optional for source control, rate or thickness monitoring
- Can accommodate up to 50 processes of 200 layers each and processes can be linked together for a maximum of 10,000 layers
- Multiple sensor averaging for up to eight sensors
- 4 meter XIU option provides the ability to use long in-vacuum sensor cables for large systems
- Optional Ethernet communications
- RoHS compliant

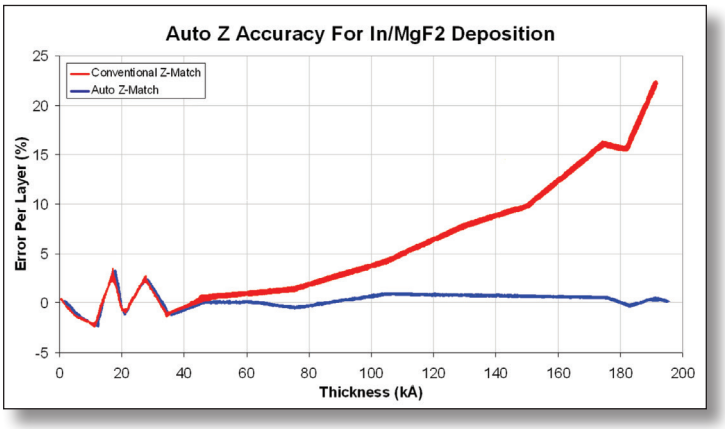
RELIABLE PROCESS CONTROL

With a comprehensive list of features, it is easy to integrate the IC6 into your system for complete process control. The IC6 has the ability to control up to six sources simultaneously for rate and thickness control. Up to twelve analog outputs are assignable for source control or for rate or thickness recording.

The instrument's logic and process control capabilities include 100 programmable logic statements, 20 counters and 20 timers. I/O capabilities provide up to 24 relay outputs, 28 TTL inputs, and 14 TTL outputs. Logic statements can be used in conjunction with external inputs or outputs; allowing the IC6 to perform functions that otherwise would require a PLC or other extra equipment. Each logic statement can include up to five functions that can be linked using Boolean logic.

For process recipe flexibility, the IC6 can accommodate 50 processes of 200 layers each. Processes can be linked together for a maximum of 10,000 layers.

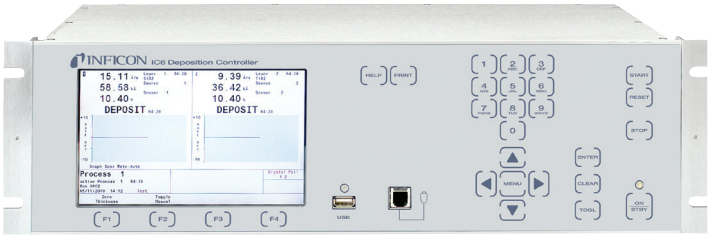
The instrument's Auto-Z function can automatically determine Z-Ratio, maintaining thickness and rate accuracy, and eliminates the need for the user to estimate the acoustic impedance. This is especially important during the deposition of different materials onto the same crystal, during co-deposition of two or more materials, or when the Z-Ratio for a material is unknown.



Auto-Z dramatically improves the accuracy of measured thickness for multiple materials and layers.

EFFORTLESS PROCESS SETUP

Operating the IC6 is easy and intuitive with a color TFT LCD display and menu-driven navigation. Information is displayed on a clear, brightly lit, screen for easy viewing. Soft keys help you maneuver quickly through the software's menus for efficient programming.



The brightly lit TFT LCD display delivers information in an easy-to-read format.

ORDERING INFORMATION

IC6 - ___ ___ ___ ___ ___ ___

Basic Configuration
- 115V 50/60 Hz — 1
- 230V 50/60 Hz — 2

Sensor Measurement Module
(Each has two sensor inputs)
- Standard Module — 1
- Two Standard Modules — 2
- Three Standard Modules — 3
- Four Standard Modules — 4

Additional Computer Communications Module (RS232 standard)
- None — 0
- Ethernet — 1

Additional I/O Relay Module
(Base unit includes eight Relay Outputs / 14 TTL Inputs)
- None — 1
- Eight Relay Outputs / 14 TTL Inputs — 2

Optional TTL Relay Module
- None — 0
- Eight Relay Outputs / 14 TTL Outputs — 1

Optional DAC Module
(Base unit includes six DAC Outputs)
- None — 0
- Additional six DAC Outputs — 1

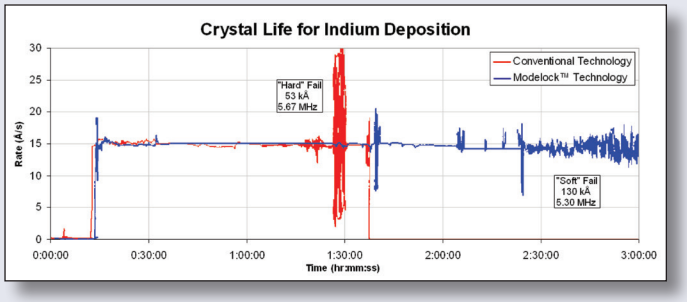
Excellence Repeatable™

HOW MODELOCK WORKS

The proven INFICON ModeLock* measurement system provides crystal-frequency information with precision not possible from conventional "active oscillator" systems. It eliminates "mode hopping," a failure to maintain crystal oscillation at the fundamental frequency. ModeLock continuously tests the monitor crystal for resonance at the fundamental frequency, thereby eliminating weaknesses inherent in the conventional measurement method.

Conventional measurement methods incorporate the quartz monitoring crystal as an active element of the oscillator circuit. Consequently, the crystal controls the oscillator circuit. So, as the electrical characteristics of the crystal change during deposition, the oscillator circuit becomes less stable and may "hop" to another resonant frequency or fail completely, resulting in an inaccurate film thickness.

More powerful and precise—yet faster—than the conventional method, ModeLock continually tests and analyzes the phase-frequency relationship of the crystal. The crystal is not an active part of the oscillator circuit. The ModeLock measurement system determines and applies a precise frequency to the crystal, preventing the crystal from "hopping," or operating at a frequency other than the fundamental. This process takes place thousands of times per second to determine the resonant frequency to a precision of 0.0035 Hz/100 ms.



INFICON ModeLock measurement technology provides significantly longer crystal life, illustrated here in the deposition of indium.

SPECIFICATIONS

Measurement Performance	
Resolution (Å/s/M)[1]	0.00433
Max. crystal frequency shift	1.5 MHz
Crystal range and precision (per 100-ms sample)	6.0 to 4.5 MHz +/- 0.0035 Hz
Thickness accuracy[2]	0.5%
Measurement frequency	10 Hz
Multiple measurement averaging	0.1, 0.4, 1.0, 4.0, 10.0, 20.0, and 30.0 s averaging allowed
Design Features	
Multiple sensor measurement	yes (up to eight sensors)
Auto-Z	yes
Autotune	yes
Co-deposition	yes (up to six sources)
Process Recipe and Data Management	
Material programs	32
Process layers (per process)	200
Processes	50 (processes can be linked together)
USB memory	yes
Data logging	yes
Hardware Features	
Sensors[3]	
Single	eight
Dual / CrystalTwo®	four / eight (with CrystalTwo Switch)
CrystalSix®	eight
Crystal 12®	eight
Generic	eight
Source Controls	
Number of sources[4]	up to six
Source control voltages	0 to +/-10 V (dc), adjustable
Output resolution	15 bits over full range [0 to 10 V (dc)]
Crucible positions	64
Inputs / Outputs	
Inputs	14 standard, up to 28 optional; TTL/CMOS logic compatible or closure to ground
Outputs	eight standard, up to 24 optional programmable SPST relays rated at 30 V (dc) or 30 V (ac) RMS or 42 V (dc) peak @ 2.5 amps; 14 optional TTL outputs
Recorder output[4]	0 to +10 V (dc), adjustable
Logic statements	100 fully programmable; up to five actions, five events per statement
Communications	
Standard	RS232
Optional	Ethernet
Display	
Thickness resolution	1 Å for 0 to 9.999 kÅ 10 Å for 10.00 to 99.99 kÅ 100 Å for 100.0 to 999.9 kÅ 1 kÅ for 1000 to 9999 kÅ
Rate resolution	0.001 Å/s for 0 to 9.999 Å/s if rate filter time setting is 10 s or greater 0.01 Å/s for 0 to 99.99 Å/s 0.1 Å/s for 100 to 999.9 Å/s
Operation	
Power requirements	100 – 230 V (ac) +/-15% 50 / 60 Hz +/-3 Hz
Operating temperature	0° to 50°C (32° to 122°F)
Dimensions, excluding mounts (H x W x D)	133 x 483 x 330 mm (5.25 x 19 x 13 in.)
Weight	5.9 kg (13 lbs)

[1] Material density = 1.0 g/cm^3; z ratio =1.0; crystal frequency = 6 MHz, Å/s/M = Angstroms / second / measurement
[2] Varies according to process; figures reflect typical accuracy
[3] Maximum configuration of each type
[4] IC6 has six D (ac) outputs standard, six more can be added as an option. Any of the 12 can be configured as source control voltages or recorder outputs however the number of sources that can be controlled simultaneously is six.

INFICON Instruments for Intelligent Control®

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