

Making Excellence Repeatable



# Cygnus<sup>®</sup> 2

Thin Film Deposition Controller  
for OLED Applications

# The Best Measurement Precision Possible for OLED Applications

Cygnus 2 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 OLED process. Cygnus 2 uses our ModeLock frequency measurement system to provide stable, high-resolution rate and thickness measurement with an industry-leading rate resolution of 0.00433 Å/s every  $\frac{1}{10}$  second. No other quartz crystal controller has the performance, quality, and features of Cygnus 2, 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
- Up to six sources can be controlled simultaneously, independently, or in any combination by one Cygnus 2, relieving the need for two or three controllers
- Color TFT LCD display makes it easy to see what is going on with your process
- 10 Hz measurement
- $\pm 0.0035$  Hz over 100 ms sample
- USB data storage for screen shots, recipe storage, and data logging
- Thickness summing of multiple sources
- Measurement rate averaging for low density, very low rate materials (up to 30 seconds for use with stable sources for very low rate OLED dopant material deposition)
- Display rate resolution of up to 0.001 Å/s
- 4 meter XIU option provides the ability to use long in-vacuum sensor cables for large systems
- Non-deposit control allows for continuous source control as substrates are cycled through the deposition chamber
- Six DAC outputs standard, six additional optional for source control, rate or thickness monitoring
- Optional Ethernet communications
- RoHS compliant

## POWERFUL PERFORMANCE

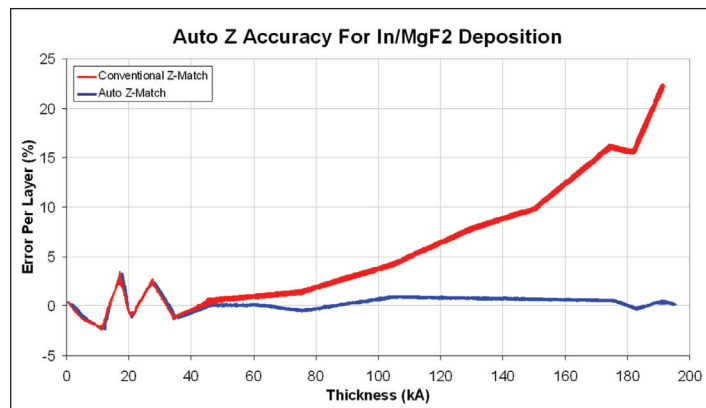
Cygnus 2 can control up to six sources simultaneously, independently, or in any combination; reducing system complexity and cost by eliminating the need for two or three controllers.

The optional INFICON Crystal 12 Sensor switches crystals automatically without interrupting your process. This allows for continuous rate monitoring, extending the time between tool venting. For source control, rate or thickness monitoring and recording, Cygnus 2 has 12 assignable analog outputs, six standard and six additional (optional). In addition, I/O capabilities provide up to 24 relay outputs, 28 TTL inputs, and 14 TTL outputs. A 4 meter XIU option enables you to use long in-vacuum sensor cables for large systems.

For stable, high resolution rate and thickness measurement and control at extremely low rates, Cygnus 2 has measurement rate averaging; valuable for low density materials deposited at very low rates (up to 30 seconds for use with stable sources for very low rate OLED dopant material deposition).

The Auto-Z function can automatically determine the Z-Ratio for organic materials, maintaining thickness and rate accuracy during the deposition of layered or doped materials. Auto-Z provides greater thickness accuracy during processes where the Z-Ratio for the material is not known or when codepositing two or more materials.

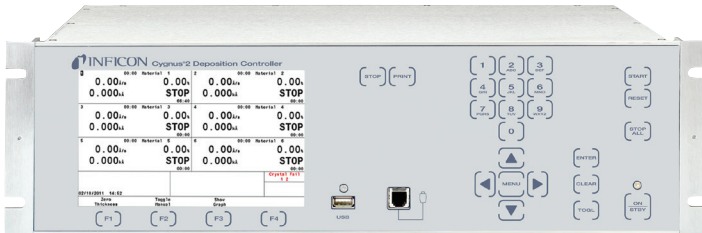
All these features make it easier to measure low density materials at low rates and communicate these measurements back to the system computer for reliable process control.



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

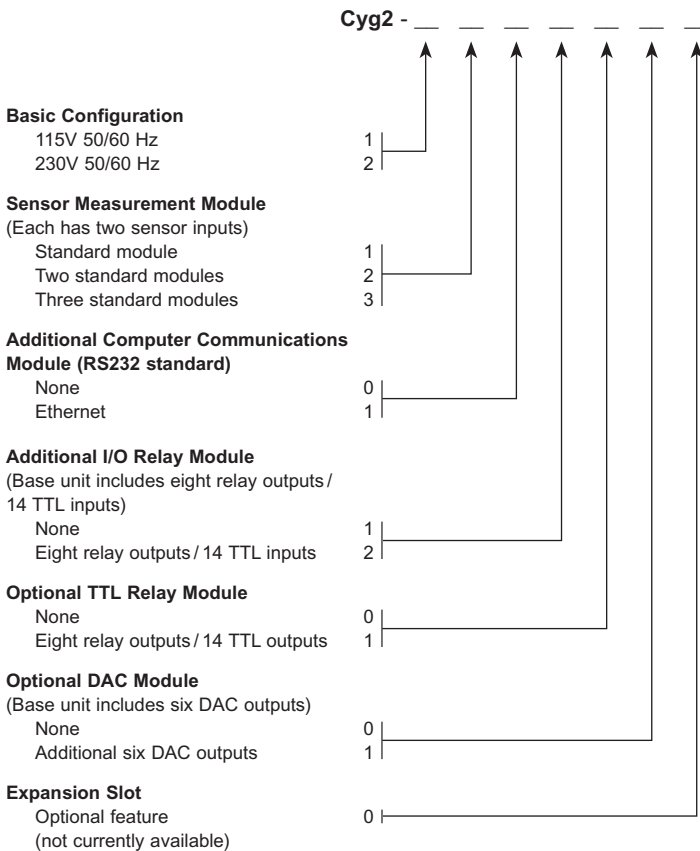
## EFFORTLESS PROCESS SETUP

Operating Cygnus 2 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 on-screen menus for efficient programming.



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

## ORDERING INFORMATION

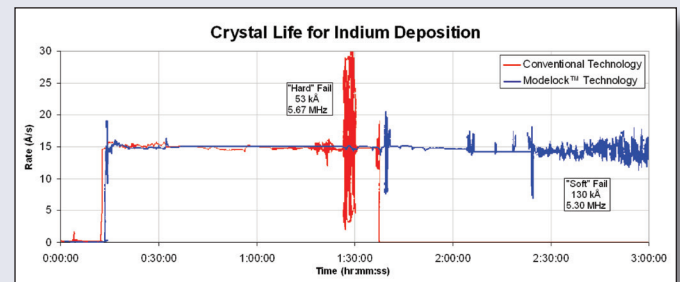


## HOW MODELOCK WORKS

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

Frequency resolution	$\pm 0.0035$ Hz @ 6 MHz
Thickness and rate resolution / measurement <sup>1</sup>	$\pm 0.00433$ Å
Measurement frequency range	6.0 to 4.5 MHz (fixed)
Thickness accuracy <sup>2</sup>	0.5%
Measurement interval	0.10 s
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 six sensors)
Auto-Z	yes
Codeposition	yes (up to six sources)

### Process Recipe and Data Management

Material programs	six independent materials
USB memory	yes
Data logging	yes

### Hardware Features

Sensors <sup>3</sup>	
Single	six
Dual with CrystalTwo®	six (with one CrystalTwo switch per sensor input)
CrystalSix®	six
Crystal 12®	six
Generic	six

### Source controls

Number of sources <sup>4</sup>	up to six
Source control voltages	0 to $\pm 10$ 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 peak @ 2.5 A; 14 optional TTL outputs
Recorder output <sup>4</sup>	0 to +10 V (dc), adjustable
Logic statements	100 fully programmable; up to five actions, five events per statement

### Communications

Standard	RS-232
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
	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 to 230 V (ac) $\pm 15\%$
	50/60 Hz $\pm 3$ 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 lb.)

<sup>1</sup> Tooling / density = 100/1, fundamental frequency = 6 MHz

<sup>2</sup> Varies according to process; figures reflect typical accuracy

<sup>3</sup> Maximum configuration of each type

<sup>4</sup> Cygnus 2 has six DAC 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.

