Thin Film Deposition Controllers, Monitors and Accessories

PRECISELY THE INSTRUMENTS YOU NEED

INFICON

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Quartz Crystal Deposition Controllers and Monitors

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IC6 Thin Film Deposition Controller

OLED Applications

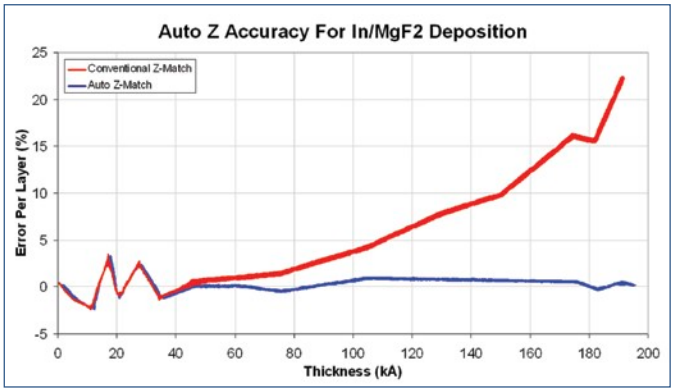
Excellence
Repeatable

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 A/s every 1/10 second. No other quartz crystal controller has the performance, quality, and features of the IC6, allowing you to make excellence repeatable.

POWERFUL PERFORMANCE

The IC6 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



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

Advantages

- 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 IC6, relieving the need for two or three controllers
- Color TFT LCD display makes it easy to see what's going on with your process
- 10 Hz measurement
- +/-0.0035 Hz over 100ms 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 0.001Å/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
- 6 DAC outputs standard, 6 additional optional for source control, rate or thickness monitoring
- Optional Ethernet communications
- RoHS compliant

IC6 – OLED (continued)

and recording, the IC6 has twelve assignable analog outputs, 6 standard and 6 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, the IC6 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 instrument's 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, when co-depositing two or more materials, or during multiple layer deposition of 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.

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.

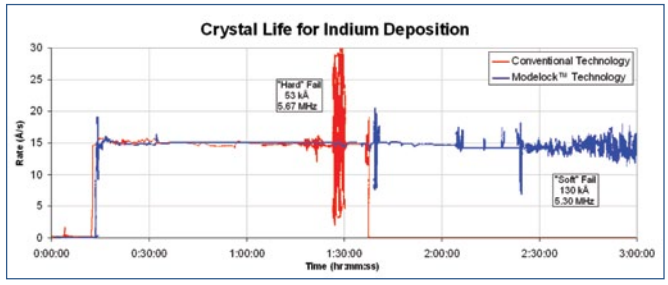
The brightly lit TFT LCD display delivers information in an easy-to-read format.

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.

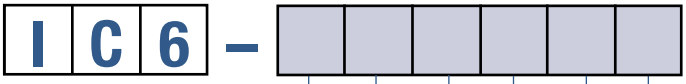
More powerful and precise—yet faster—than the conventional method, ModeLock continually tests and analyzes the phase-frequency relationship of the crystal. The crystal is not an active part of the oscillator circuit. The ModeLock measurement system determines and applies a precise frequency to the crystal, 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.

IC6 – OLED (continued)

Ordering Information



Basic Configuration

115V 50/60 Hz	1
230V 50/60 Hz	2

Sensor Measurement Module
(Each has 2 sensor inputs)

Standard Module	1
2 Standard Modules	2
3 Standard Modules	3
4 Standard Modules	4

Additional Computer Communications Module (RS232 standard)

None	0
Ethernet	1

Optional DAC Module
(Base unit includes 6 DAC Outputs

0	None
1	Additional 6 DAC Outputs

Optional TTL Relay Module

0	None
1	8 Relay Outputs / 14 TTL Inputs

Additional I/O Relay Module
(Base unit includes 8 Relay Outputs / 14 TTL Inputs)

1	None
2	8 Relay Outputs / 14 TTL Inputs

Accessories and Replacement Parts

IC6 Controller Accessories

781-132-G1	**Sensor Measurement Module** - A plug-in module capable of simultaneously interfacing two sensors via rear panel connectors
781-122-G1	**I/O Relay Module** - A plug-in module with eight programmable relay outputs and 14 programmable TTL inputs
781-122-G2	**TTL Relay Module** - A plug-in module with eight programmable relay outputs and 14 programmable TTL outputs
781-162-G1	**Optional DAC Board** - A plug-in module for the IC6 deposition controller expanding the number of DAC outputs for monitoring Rate or Thickness
755-262-G1	**Hand-held Power Controller** - A hand-held unit that allows remote control of deposition power levels while the controller is in manual mode. The hand-held power controller plugs into the control unit front panel. Compatible with IC6, XTC/3, IC/5, Cygnus.

IC6 – OLED (continued)

Accessories and Replacement Parts (continued)

IC6 and XTC/3 XIU Packages and Interconnect Cables

An XIU (oscillator) package includes all the cables between the controller and XIU (oscillator), an XIU, and the cable between the XIU and the vacuum feedthrough. One XIU (oscillator package) is required for each crystal sensor assembly connected to the controller.
Note: The Dual Crystal sensor assembly, when used with the XTC/3 or IC6 requires either one XIU package and one CrystalTwo Switch (part # 779-220-G1 or -G2) ***OR*** two XIU packages.

	IC6, XTC/3M, and XTC/3S XIU (Oscillator) Packages
781-611-G15	XIU PKG with 15' (4.6m) cable - For use with IC6 and XTC/3
781-611-G30	XIU PKG with 30' (9.1m) cable - For use with IC6 and XTC/3
781-611-G50	XIU PKG with 50' (15.3m) cable - For use with IC6 and XTC/3
781-611-G100	XIU PKG with 100' (30.5m) cable - For use with IC6 and XTC/3
781-612-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-613-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.

	IC6, XTC/3M and XTC/3S XIU ONLY (No Cables)
781-600-G1	IC6, XTC/3 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 6" to 72" (15cm to 183cm)
781-600-G2	IC6, XTC/3 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 118" to 157" (3 to 4 Meters)

	IC6, XTC/3M, and XTC/3S Interconnect Cables
755-257-G6	6" (5.2 cm) cable, XIU to vacuum feedthrough
600-1261-P15	15' (4.6m) cable, IC6 or XTC/3 controller to XIU
600-1261-P30	30' (9.1m) cable, IC6 or XTC/3 controller to XIU
600-1261-P50	50' (15.3m) cable, IC6 or XTC/3 controller to XIU
600-1261-P100	100' (30.5m) cable, IC6 or XTC/3 controller to XIU

IC6 – OLED (continued)

Specifications

Measurement Performance	
Resolution (A/s/M)[1]	0.00433
Max. crystal frequency shift	1.5 MHz
Crystal range & 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 sec. averaging allowed
Design Features	
Multiple sensor measurement	yes (up to 8 sensors)
Auto Z	yes
Autotune	yes
Co-deposition	yes (up to 6 sources)
Process Recipe & 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	8
Dual / CrystalTwo®	4 / 8 (with CrystalTwo Switch)
CrystalSix®	8
Crystal 12®	8
Generic	8
Source Controls	
Number of sources[4]	up to 6
Source control voltages	0 to +/-10 V, adjustable
Output resolution	15 bits over full range (0 to 10V)
Crucible positions	64
Inputs / Outputs	
Inputs	14 standard, up to 28 optional; TTL/CMOS logic compatible or closure to ground
Outputs	8 standard, up to 24 optional programmable SPST relays rated at 30 V(dc) or 30 V(ac) RMS or 42 V peak @ 2.5 amps; 14 optional TTL outputs
Recorder output[4]	0 to +10 V, adjustable
Logic statements	100 fully programmable; up to 5 actions, 5 events per statement
Communications:	
Standard	RS232
Optional	Ethernet

[1]Material density = 1.0; z ratio =1.0; crystal frequency = 6 MHz, A/s/M = Angstroms / second / measurement
[2]Varies according to process; figures reflect typical accuracy
[3]Maximum configuration of each type
[4]The IC6 has 6 DAC outputs standard, 6 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 6.

IC6 – OLED (continued)

Specifications (continued)

Display	
Thickness resolution	1 A for 0 to 9.999 kA
	10 A for 10.00 to 99.99 kA
	100 A for 100.0 to 999.9 kA
	1 kA for 1000 to 9999 kA
Rate resolution	0.001 for 0 to 9.999 A/s if rate filter time setting is 10 seconds or greater
	0.01 for 0 to 99.99 A/s
	0.1 for 100 to 999.9 A/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)	5.25” x 19” x 13” (133mm x 483mm x 330 mm)
Weight	23 lbs (10.5 kg)

IC6 Thin Film Deposition Controller

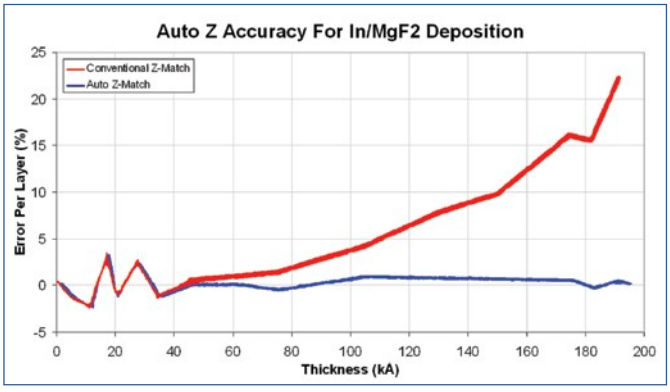
Excellence Repeatable

Optical Applications

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 A/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.

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.



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

Advantages

- 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 6 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)
- 6 DAC outputs standard, 6 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 8 sensors
- 4 meter XIU option provides the ability to use long in-vacuum sensor cables for large systems
- Optional Ethernet communications
- RoHS compliant

IC6 – Optical (continued)

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.

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.

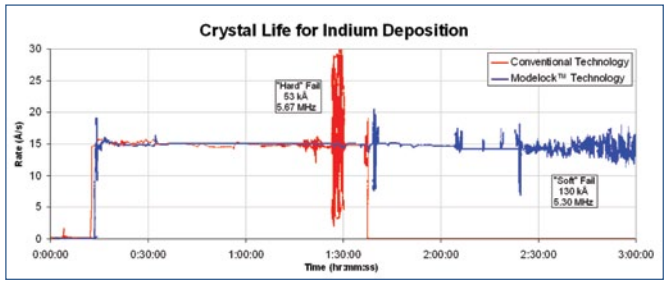
The brightly lit TFT LCD display delivers information in an easy-to-read format.

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.

IC6 – Optical (continued)

Ordering Information

Basic Configuration

115V 50/60 Hz	1
230V 50/60 Hz	2

Sensor Measurement Module
(Each has 2 sensor inputs)

Standard Module	1
2 Standard Modules	2
3 Standard Modules	3
4 Standard Modules	4

Additional Computer Communications Module (RS232 standard)

None	0
Ethernet	1

Optional DAC Module
(Base unit includes 6 DAC Outputs

0	None
1	Additional 6 DAC Outputs

Optional TTL Relay Module

0	None
1	8 Relay Outputs / 14 TTL Inputs

Additional I/O Relay Module
(Base unit includes 8 Relay Outputs / 14 TTL Inputs)

1	None
2	8 Relay Outputs / 14 TTL Inputs

Accessories and Replacement Parts

IC6 Controller Accessories

781-132-G1	**Sensor Measurement Module** - A plug-in module capable of simultaneously interfacing two sensors via rear panel connectors
781-122-G1	**I/O Relay Module** - A plug-in module with eight programmable relay outputs and 14 programmable TTL inputs
781-122-G2	**TTL Relay Module** - A plug-in module with eight programmable relay outputs and 14 programmable TTL outputs
781-162-G1	**Optional DAC Board** - A plug-in module for the IC6 deposition controller expanding the number of DAC outputs for monitoring Rate or Thickness
755-262-G1	**Hand-held Power Controller** - A hand-held unit that allows remote control of deposition power levels while the controller is in manual mode. The hand-held power controller plugs into the control unit front panel. Compatible with IC6, XTC/3, IC/5, Cygnus.

IC6 – Optical (continued)

Accessories and Replacement Parts (continued)

IC6 and XTC/3 XIU Packages and Interconnect Cables

An XIU (oscillator) package includes all the cables between the controller and XIU (oscillator), an XIU, and the cable between the XIU and the vacuum feedthrough. One XIU (oscillator package) is required for each crystal sensor assembly connected to the controller.
Note: The Dual Crystal sensor assembly, when used with the XTC/3 or IC6 requires either one XIU package and one CrystalTwo Switch (part # 779-220-G1 or -G2) ***OR*** two XIU packages.

	IC6, XTC/3M, and XTC/3S XIU (Oscillator) Packages
781-611-G15	XIU PKG with 15' (4.6m) cable - For use with IC6 and XTC/3
781-611-G30	XIU PKG with 30' (9.1m) cable - For use with IC6 and XTC/3
781-611-G50	XIU PKG with 50' (15.3m) cable - For use with IC6 and XTC/3
781-611-G100	XIU PKG with 100' (30.5m) cable - For use with IC6 and XTC/3
781-612-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-613-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.

	IC6, XTC/3M and XTC/3S XIU ONLY (No Cables)
781-600-G1	IC6, XTC/3 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 6" to 72" (15cm to 183cm)
781-600-G2	IC6, XTC/3 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 118" to 157" (3 to 4 Meters)

	IC6, XTC/3M, and XTC/3S Interconnect Cables
755-257-G6	6" (5.2 cm) cable, XIU to vacuum feedthrough
600-1261-P15	15' (4.6m) cable, IC6 or XTC/3 controller to XIU
600-1261-P30	30' (9.1m) cable, IC6 or XTC/3 controller to XIU
600-1261-P50	50' (15.3m) cable, IC6 or XTC/3 controller to XIU
600-1261-P100	100' (30.5m) cable, IC6 or XTC/3 controller to XIU

IC6 – Optical (continued)

Specifications

Measurement Performance	
Resolution (A/s/M)[1]	0.00433
Max. crystal frequency shift	1.5 MHz
Crystal range & 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 sec. averaging allowed
Design Features	
Multiple sensor measurement	yes (up to 8 sensors)
Auto Z	yes
Autotune	yes
Co-deposition	yes (up to 6 sources)
Process Recipe & 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	8
Dual / CrystalTwo®	4 / 8 (with CrystalTwo Switch)
CrystalSix®	8
Crystal 12®	8
Generic	8
Source Controls	
Number of sources[4]	up to 6
Source control voltages	0 to +/-10 V, adjustable
Output resolution	15 bits over full range (0 to 10V)
Crucible positions	64
Inputs / Outputs	
Inputs	14 standard, up to 28 optional; TTL/CMOS logic compatible or closure to ground
Outputs	8 standard, up to 24 optional programmable SPST relays rated at 30 V(dc) or 30 V(ac) RMS or 42 V peak @ 2.5 amps; 14 optional TTL outputs
Recorder output[4]	0 to +10 V, adjustable
Logic statements	100 fully programmable; up to 5 actions, 5 events per statement
Communications:	
Standard	RS232
Optional	Ethernet

[1]Material density = 1.0; z ratio =1.0; crystal frequency = 6 MHz, A/s/M = Angstroms / second / measurement
[2]Varies according to process; figures reflect typical accuracy
[3]Maximum configuration of each type
[4]The IC6 has 6 DAC outputs standard, 6 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 6.

IC6 – Optical (continued)

Specifications (continued)

Display	
Thickness resolution	1 A for 0 to 9.999 kA
	10 A for 10.00 to 99.99 kA
	100 A for 100.0 to 999.9 kA
	1 kA for 1000 to 9999 kA
Rate resolution	0.001 for 0 to 9.999 A/s if rate filter time setting is 10 seconds or greater
	0.01 for 0 to 99.99 A/s
	0.1 for 100 to 999.9 A/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)	5.25” x 19” x 13” (133mm x 483mm x 330 mm)
Weight	23 lbs (10.5 kg)

XTC/3 Thin Film Deposition Controller

ADVANCED, AFFORDABLE RATE CONTROL FOR SINGLE OR MULTIPLE LAYERS

Now get everything you want in a thin film deposition controller for single and multiple-layer processes. The XTC/3 with patented ModeLock provides proven mode hop prevention for consistent quality. With the XTC/3 Thin Film Deposition Controller, you get highly accurate control of deposition rate and thickness, the capacity for virtually any number of layers, easy installation, and extremely high reliability to ensure productivity.

INFICON, the global leader in thin film deposition control, now offers an instrument with a remarkably low cost of ownership for unprecedented value.

Whether your control needs reflect production or research and development use, you will find a precise match in the INFICON XTC/3.

WORLDWIDE INFICON SUPPORT

No matter where you are, you get fast answers, attentive service, and maximum uptime. With offices around the world, INFICON is the only manufacturer of thin film deposition controllers to offer you local service and technical support around the world.

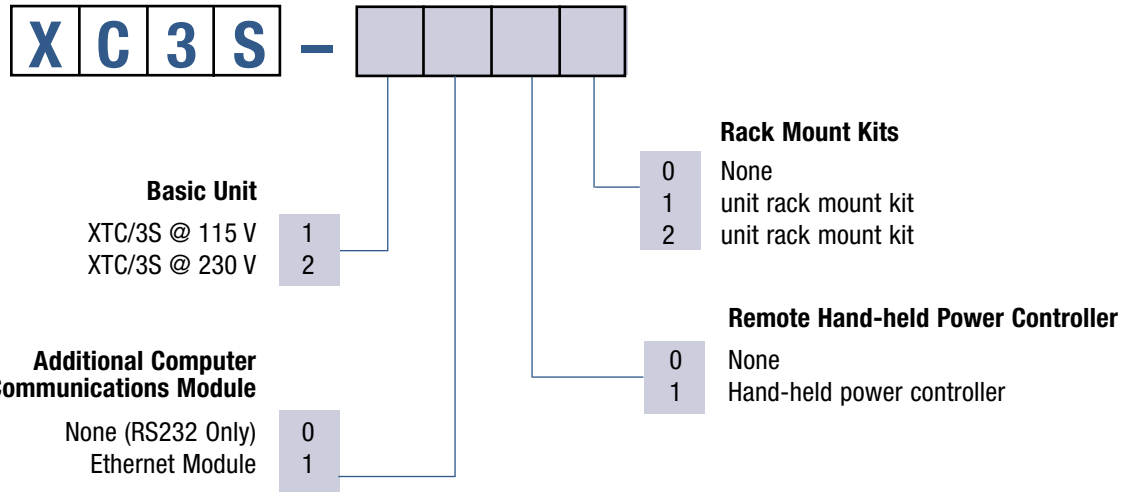
Advantages

- Available in single-layer and multiple-layer models
- Patented ModeLock technology prevents film thickness errors caused by mode-hopping
- Supports INFICON Crystal 12®, Crystal Six®, and dual sensor automatic crystal switching for maximum productivity
- XTC/3M multiple-layer model supports up to 99 processes, 999 layers, 32 films, 2 sensors, and two sources
- XTC/3S single-layer model supports up to 9 films, 2 sensors, and two sources
- Easy-to-read TFT LCD graphics displays
- Films and processes can be assigned unique, descriptive names for easy retrieval
- Ethernet connection available
- Free-standing (no computer necessary) or optional Windows® software for PC operation
- Plug-and-play replacement for INFICON XTC/2 controllers (limited to XTC/2 features and command set)

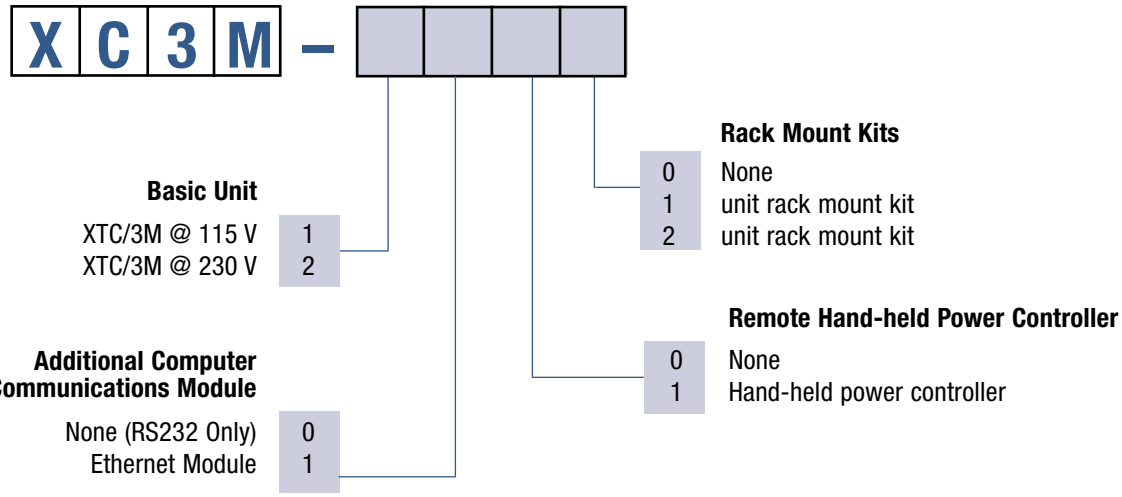
XTC/3 (continued)

Ordering Information

XTC3S - Single-Layer Controller



XTC3M - Multiple-Layer Controller



XTC/3 (continued)

Accessories and Replacement Parts

XTC/3 Accessories

780-700-G1	**Ethernet Computer Communications Module** - A plug-in Ethernet module providing industry standard signaling protocols and connectors for accepting operational commands from remote sources.
755-262-G1	**Hand-held Power Controller** - A Hand-held unit that allows remote control of deposition power levels while the controller is in manual mode. The hand-held power controller plugs into the control unit front panel.
780-702-G1	**1 unit rack mount kit** - A rack mount kit provides all required materials to mount the control unit into a standard rack. The control units are 1/2 rack.
780-702-G2	**2 unit rack mount kit** - in width, thus 2 units can be mounted side by side in one standard rack width.
780-032-G1	**XTC/3M or XTC/3S Editor / Monitor Software**, on CD - Windows®-based applications software that allows complete programming, monitoring, and datalogging of an XTC/3M or XTC/3S.
780-038-G1	**XTC/3M or XTC/3S Communications Library** (DLL), on CD - Contains functions that allow the creation of a program for a remote PC to control either an XTC/3M or XTC/3S via an RS232 or TCP/IP connection.

XTC/3M, XTC/3S, and IC6 XIU Packages and Interconnect Cables

An XIU (oscillator) package includes all the cables between the controller and XIU (oscillator), an XIU, and the cable between the XIU and the vacuum feedthrough. One XIU (oscillator package) is required for each crystal sensor assembly connected to the controller.
Note: The Dual Crystal sensor assembly, when used with the XTC/3 or IC6 requires either one XIU package and one CrystalTwo Switch (part # 779-220-G1 or -G2) ***OR*** two XIU packages.

	XTC/3M, XTC/3S and IC6 XIU (Oscillator) Packages
781-611-G15	XIU PKG with 15' (4.6m) cable - For use with XTC/3 and IC6
781-611-G30	XIU PKG with 30' (9.1m) cable - For use with XTC/3 and IC6
781-611-G50	XIU PKG with 50' (15.3m) cable - For use with XTC/3 and IC6
781-611-G100	XIU PKG with 100' (30.5m) cable - For use with XTC/3 and IC6
781-612-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-612-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 4m in-vacuum cable and 6" BNC (XIU to Feedthrough) cable.
781-613-G15	4m XIU PKG w/ 15' (4.6m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G30	4m XIU PKG w/ 30' (9.1m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G50	4m XIU PKG w/ 50' (15.3m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.
781-613-G100	4m XIU PKG w/ 100' (30.5m) XIU cable - Includes 3.5m in-vacuum cable and 20" BNC (XIU to Feedthrough) cable.

	XTC/3M, XTC/3S and IC6 XIU ONLY (No Cables)
781-600-G1	XTC/3, IC6 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 6" to 72" (15cm to 183cm)
781-600-G2	XTC/3, IC6 XIU (Oscillator) - For XIU to Sensor Head cable lengths of 118" to 157" (3 to 4 Meters)

	XTC/3M, XTC/3S and IC6 Interconnect Cables
755-257-G6	6" (5.2 cm) cable, XIU to vacuum feedthrough
600-1261-P15	15' (4.6m) cable, XTC/3 or IC6 controller to XIU
600-1261-P30	30' (9.1m) cable, XTC/3 or IC6 controller to XIU
600-1261-P50	50' (15.3m) cable, XTC/3 or IC6 controller to XIU
600-1261-P100	100' (30.5m) cable, XTC/3 or IC6 controller to XIU

SQC310 Series
Thin Film Deposition Controllers

THE MOST AFFORDABLE, ADVANCED MULTI-LAYER CONTROLLER— FROM THE TECHNOLOGY LEADER

With advanced electronics, an improved display, and a very affordable price, the INFICON SQC310 Series gives you features not found on competitors' thin film controllers. And you can choose the ideal model for your application: sequential deposition (SQC310) or co-deposition (SQC310C).

For sequential deposition, the SQC310 features 2 sensor inputs, 2 source outputs, and 8 digital inputs/outputs, with an optional expansion card that doubles these numbers. For co-deposition, the SQC310C controller monitors up to 4 quartz crystal sensors, with 4 PID control outputs, 16 digital inputs, and 16 relay outputs to the same specs as the SQC310.

WORLDWIDE SUPPORT— OUR EXPERTISE IS YOUR COMPETITIVE ADVANTAGE

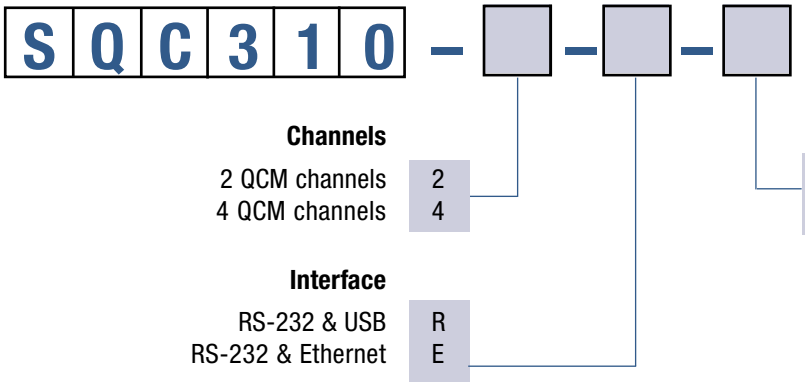
INFICON is the only manufacturer of thin film deposition controllers with local service and technical support around the world—including a broad selection of sensors, feedthroughs, and accessories to complement the SQC310 Series controllers. When you purchase your SQC310 series instrument—or any other INFICON product—you can be assured of fast answers, attentive service, and maximum uptime.

Advantages

- Bright, ¼ VGA active matrix color LCD display – available in English or Chinese
- Standard RS-232 and USB (with Ethernet option)
- Easy setup and operation with a "Quick Setup" Menu, 6 context-sensitive push buttons, and convenient parameter setting knob
- Windows® program for developing, testing, and downloading processes, and for logging instrument data to your PC for process analysis and quality control
- Accurate process control, especially for low deposition rates, with ± 0.03 Hz resolution at 10 readings/second, and with ± 2 ppm frequency stability over 0° to 50°C
- Storage capacity for up to 100 processes, 1,000 layers, 50 films
- Monitoring of source material with a single sensor or with multiple sensors to provide accurate source distribution monitoring

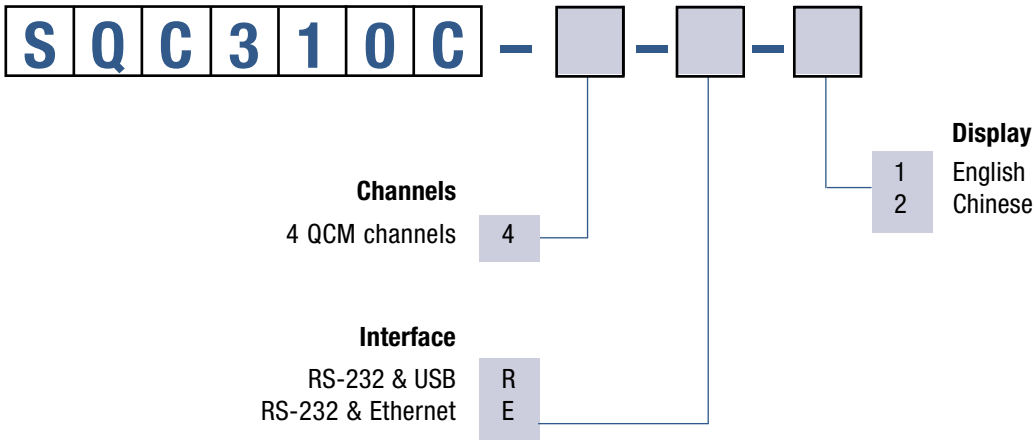
SQC310 Series (continued)

Ordering Information



Example of a complete system:

SQC310-2-R-1	SQC310 sequential controller with 2 channels, RS232 and USB interface, and English display
782-934-003-10	Oscillator kit- includes 782-900-010 Oscillator, 782-902-011 6" (150mm) BNC cable, male/female, and 782-902-012-10 10' (3m) BNC cable, male/male.



SQC310 Series (continued)

Accessories and Replacement Parts

Accessories

782-900-017	Handheld Power Control, 10' (3m) coiled cable
782-900-007	Rack Extender - mounts one 5¼" instrument in 19" rack
782-900-016	Rack Adapter - mounts two 5¼" instruments in 19" rack
782-900-008	3½" Full Rack Extender -For SQC-330 or SQM160 hardware to mount one instrument in a 19" rack
782-900-014	3½" Half Rack Adapter -For SQC-330 or SQM160 hardware to mount two instruments in a 19" rack
782-900-026	Ethernet Option Card

Oscillators and Cables

782-934-003-10	Oscillator kit includes: 782-900-010, 782-902-011, 782-902-012-10
782-934-003-25	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-25
782-934-003-50	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-50
782-934-003-99	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-99
782-900-010	Remote Oscillator
782-902-011	BNC Cable, male/female, 6" (150mm)
782-902-012-10	10' (3m) BNC Cable, male/male
782-902-012-25	25' (7.7m) BNC Cable, male/male
782-902-012-50	50' (15.4m) BNC Cable, male/male
782-902-012-99	100' (30.7m) BNC Cable, male/male
782-902-022	BNC to Microdot. Adapter Cable, 6" (150mm)

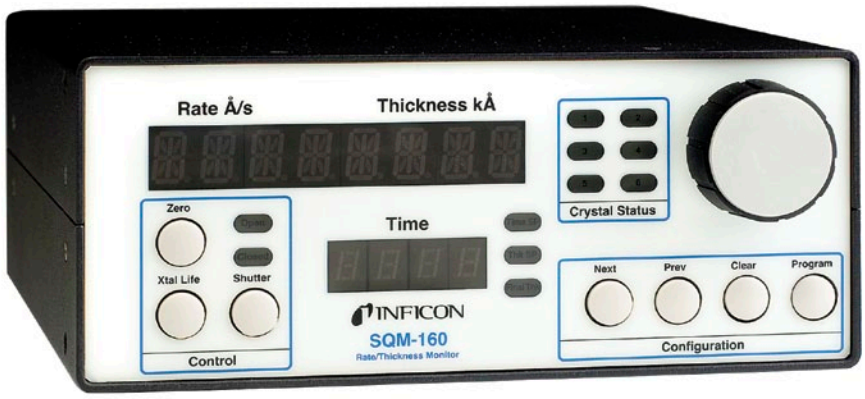
782-932-022	1/8" to 3/16" Compression Adapter
782-932-020	1/8" Compression Union
782-932-021	3/16" Compression Union

SQC310 Series (continued)

Specifications

	SQC310	SQC310C
Measurement		
QCM Inputs	2 (4 optional)	4
Frequency Range	4 to 6 MHz	
Frequency Resolution	± 0.03 Hz at 0.10 sec measurement period	
Frequency Stability	± 2 ppm total, 0 to 50C	
Measurement Rate	1 to 10 Hz	
Rate Display	0.01 Å/sec	
Control		
Storage	100 processes, 1000 layers, 50 films	
Control Outputs	2 (4 optional)	4
Output Signal	± 0 to 10 VDC, 15 bits	
Digital Inputs/Relays	8 (16 optional)	16
Digital Inputs	5 VDC non-isolated	
Relays	SPST Form 1A, 30V, 2A max	
Interface(s)	RS-232 and USB (Ethernet optional)	
Remote Power Control	Optional	
Display		
Type	1/4 VGA 320 x 240 active matrix color LCD	
Graphs	Rate, deviation, power or full screen numeric	
General		
Power	100-240 VAC, 50/60 Hz, 25 W	
Compliance	CE	
Windows® Software	Included	
Housing / Mounting	5 1/4" half-rack	

SQM160 Multi–Film Rate / Thickness Monitor



MULTI-CHANNEL QUARTZ CRYSTAL MONITOR

The SQM160 uses proven INFICON quartz crystal sensor technology to measure rate and thickness in thin film deposition processes. Two sensor inputs are standard and four additional sensor inputs are optional. Two recorder outputs provide analog rate and thickness signals.

Sensor inputs can be assigned to different materials, averaged for accurate deposition control in large systems, or configured for a dual sensor. The rate sampling mode allows a shuttered sensor to extend sensor life in high rate processes. Rate displays of 0.1Å/s or 0.01Å/s are user selectable. In addition, Frequency or Mass displays can be selected. Four relay outputs allow the SQM160 to control source or sensor shutters, signal time and thickness setpoints, and signal crystal failure. Digital inputs allow external signals to start/stop and zero readings.

The SQM160 comes with an RS-232 port and Windows® software that allows instrument setup from your computer. The software can be used to set and store all parameters, operate the instrument, and save process data in an Excel® file format. USB or Ethernet options add to the communications flexibility.

EASY TO USE

To start rate and thickness measurements, press Zero to null the last thickness reading, then Shutter to open the source or sensor shutter. The large, bright LEDs simultaneously show thickness and rate readings that are visible from across the room. When the desired thickness is reached, or time has elapsed, the shutter closes and the appropriate front panel annunciators light. Press the Xtal Life button at any time to view the remaining crystal life.

Two menus control instrument setup for the 99 stored films. To access the menus, press Program. Turn the setting knob to select/edit parameters. The main display shows menu prompts, and values are shown in the auxiliary (Time) display.

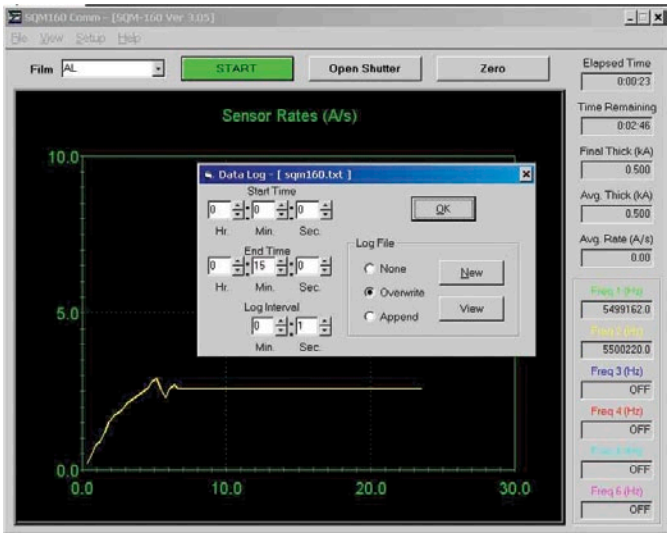
HIGH ACCURACY, LOW COST

Standard frequency resolution is 0.12Hz at four readings per second. The high accuracy option increases resolution to 0.03Hz at 10 readings per second. Temperature stability is 2ppm over the entire operating range. This combination of high accuracy and high stability are unmatched in an instrument at this price!

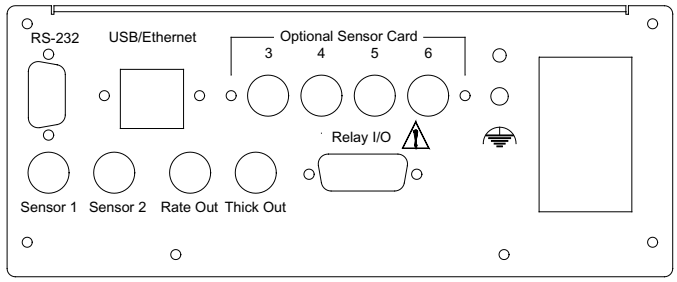
Advantages

- Two measurement channels standard, an additional four optional
- Analog outputs for rate/thickness recording
- High accuracy option: 0.03Hz at 10 readings/sec
- RS-232 standard, USB or Ethernet optional

SQM160 (continued)



Enhanced software provides a visual display of process data for easy process analysis and documentation. Backup of the SQM160 setup data allows for process consistency.



SQM160 back panel

Ordering Information

S Q M 1 6 0 – [ ] – [ ] – [ ]

Base Controller

Standard Resolution	S
High Resolution	H

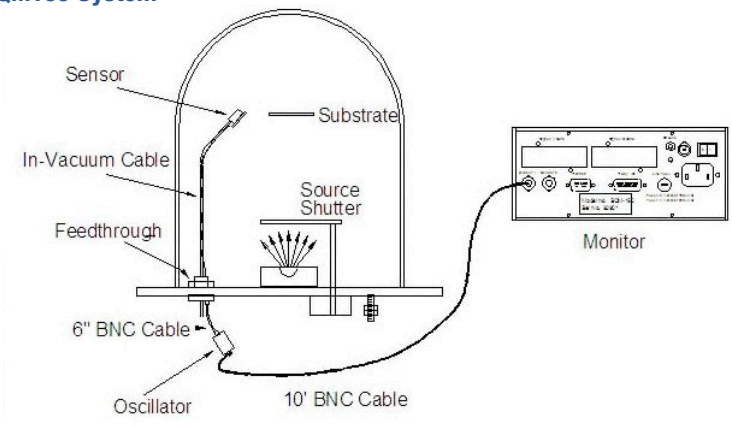
Number of Channels

Standard	2
Optional	6

Interface

R	Standard RS-232
U	Optional USB
E	Optional Ethernet

Typical SQM160 System



A typical QCM system consists of the SQM160 monitor and at least one sensor and feedthrough for each sensor.

SQM160 (continued)

Accessories

782-900-008	19" Rack Mount for one SQM160
782-900-014	19" Rack Mount for two SQM160
782-502-062	4-Sensor Option Card (converts a 2-channel SQM160 to the 6-channel configuration)
782-900-042	High Resolution Option (converts a standard resolution SQM160 to high resolution - this option must be factory installed)
782-900-040	USB Option Card
782-900-041	Ethernet Option Card

Accessories and Replacement Parts

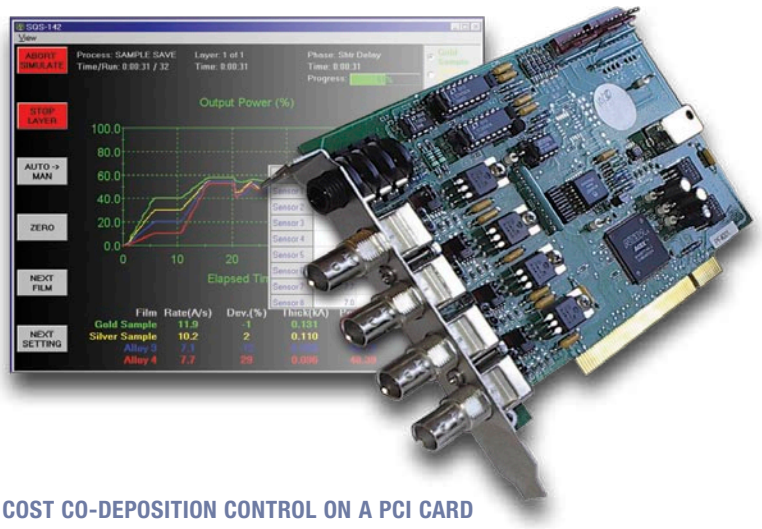
Accessories	
782-900-017	Handheld Power Control, 10' (3m) coiled cable
782-900-007	Rack Extender - mounts one 5¼" instrument in 19" rack
782-900-016	Rack Adapter - mounts two 5¼" instruments in 19" rack
782-900-008	3½" Full Rack Extender -For SQC-330 or SQM160 hardware to mount one instrument in a 19" rack.
782-900-014	3½" Half Rack Adapter -For SQC-330 or SQM160 hardware to mount two instruments in a 19" rack.
782-900-026	Ethernet Option Card
Oscillators and Cables	
782-934-003-10	Oscillator kit includes: 782-900-010, 782-902-011, 782-902-012-10
782-934-003-25	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-25
782-934-003-50	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-50
782-934-003-99	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-99
782-900-010	Remote Oscillator
782-902-011	BNC Cable, male/female, 6" (150mm)
782-902-012-10	10' (3m) BNC Cable, male/male
782-902-012-25	25' (7.7m) BNC Cable, male/male
782-902-012-50	50' (15.4m) BNC Cable, male/male
782-902-012-99	100' (30.7m) BNC Cable, male/male
782-902-022	BNC to Microdot. Adapter Cable, 6" (150mm)
782-932-022	1/8" to 3/16" Compression Adapter
782-932-020	1/8" Compression Union
782-932-021	3/16" Compression Union

SQM160 (continued)

Specifications

QCM Sensor Inputs	Standard: 2; optional: 4
Frequency Range	1-6.5 MHz
Frequency Resolution	Standard: ± 0.12 Hz at 4 readings/sec Optional: ± 0.03 Hz at 10 readings/sec
Frequency Stability	± 2 ppm total, over 0º to 50ºC
Selectable Measurement Period	0.10 to 2 sec (in .05 sec increments)
Measurement Filter	1 to 20 readings
Stored Films	99
Analog Outputs	Two 0 to 5 VDC, rate & thickness
Digital Inputs/Outputs	Two inputs, four relay outputs
Digital Interface	Standard: RS-232 Optional: USB or Ethernet
Power	100-120/200-240 VAC, 50/60 Hz, 20 W
CE Compliance	Class 1 equipment, 73/72/EEC LVD, 89/336/EEC ECD
Housing/Mounting	1/2-rack cabinet, 3-1/2" high, 89 x 213 x 197mm (3-1/2" x 8-1/2" x 7-3/4")
Weight	2.7 Kg (6 lbs)
Windows Software (included)	Provides remote setup and operation, datalogging functions - see sample screenshot below.

SQM242 Thin Film Co-Deposition Controller Card



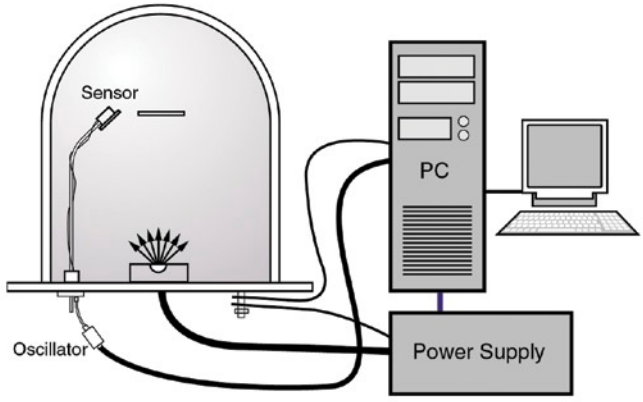
LOW COST CO-DEPOSITION CONTROL ON A PCI CARD

The SQM242 card turns your PC into a thin film co-deposition controller. It is the ideal choice for system OEMs, or anyone wishing to incorporate a thin film deposition controller into their existing computer control system.

In this typical single sensor deposition system, an SQM242 card is installed in a PCI slot of the computer. A quartz crystal sensor is connected to one of the four SQM242 inputs, and one of the SQM242 outputs is connected to the control input of the deposition power supply. The card's internal PID loop compares measured deposition rate against the desired rate, and adjusts the output signal to the power supply to achieve the desired rate. For manual process control, the SQM242 can also monitor deposition rate and thickness.

Co-deposition is readily accomplished by assigning one or more sensors and a control output to each source material. The deposition rate for each material is controlled independently by its own PID loop. Each SQM242 Card can control co-deposition of two materials. Use additional cards in a single computer to co-deposit more materials.

A small daughter card, the SAM242, provides four ±10V analog inputs and two additional control outputs. These inputs can monitor another process instrument, such as an optical monitor,



Advantages

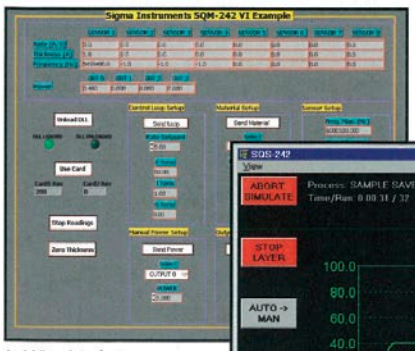
- Four sensor inputs, two control outputs
- Use multiple cards for more sensors/outputs
- Four optional analog inputs (SAM242)
- LabView and Visual Basic software
- Source code included for system integration

SQM242 (continued)

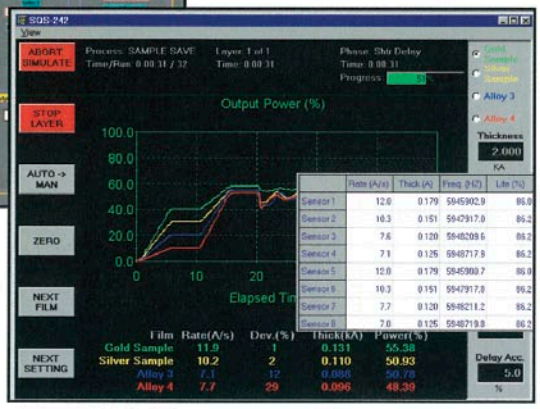
for endpoint detection. Analog inputs can also be assigned to any output for control of substrate heating, temperature controlled deposition, etc.

LabView™ and Visual Basic® programs (with source code) provide basic functionality and demonstrate programming techniques. These programs can be modified for your own use or used with any user program that supports Windows ActiveX® (COM) technology.

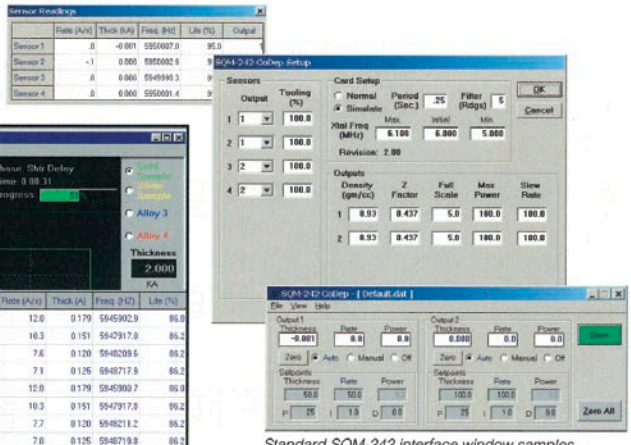
For those who prefer a turnkey package, add the optional SQS242 software for unlimited process recipes, graphing, PLC based digital I/0, and RS-232/Ethernet communications. Whichever solution you choose, the SQM-242 card provides unmatched capability, flexibility, and value in a thin film deposition controller.



LabView interface



Optional SQS-242 interface



Standard SQM-242 interface window samples

SQM242 (continued)

Accessories and Replacement Parts

Oscillators and Cables

782-934-003-10	Oscillator kit includes: 782-900-010, 782-902-011, 782-902-012-10
782-934-003-25	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-25
782-934-003-50	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-50
782-934-003-99	Oscillator kit includes: 782-900-010, 782-902-011, and 782-902-012-99
782-900-010	Remote Oscillator
782-902-011	BNC Cable, male/female, 6” (150mm)
782-902-012-10	10’ (3m) BNC Cable, male/male
782-902-012-25	25’ (7.7m) BNC Cable, male/male
782-902-012-50	50’ (15.4m) BNC Cable, male/male
782-902-012-99	100’ (30.7m) BNC Cable, male/male
782-902-022	BNC to Microdot. Adapter Cable, 6” (150mm)
782-932-022	1/8” to 3/16” Compression Adapter
782-932-020	1/8” Compression Union
782-932-021	3/16” Compression Union

SQM242 (continued)

Specifications

Computer Requirements

SQM242 cards work in any PC with a 90 MHz Pentium or better CPU, and operates on Windows® 98SE/ME/NT/2000/XP, Vista. One PCI slot is required for each SQM242 or SAM242 card.

SQM242 Thin Film Co-Deposition Controller Card - P/N 782-SQM-242

Sensor Inputs	Four QCM Active Oscillators	**Outputs**	Two Analog Signals
Connectors	BNC	Connectors	Dual 1/4" phone jack
Frequency Range	1 to 10 MHz	Signal	0 to ±10 Vdc
Frequency Resolution	0.05 Hz	Resolution	15 bits
Rate Resolution*	0.05 Å/sec *	Impedence	1 KΩ
Thickness Resolution*	0.02 Å *	PC Interface	Standard PCI Slot
Sample Period	0.1 to 2 sec		

* Rate and thickness resolution values given for Period = 0.5 sec and Density = 2.73 gm/cm3 (aluminum)

SAM242 Analog I/O Card - P/N 782-SAM-242

Inputs	Four analog signals	**Outputs**	Two analog signals
Signals	0 to ±10 Vdc	Signal	0 to ±10 Vdc
Resolution	16 bit	Resolution	16 bit
Connectors	BNC	Impedance	1KΩ
		Connector	Dual 1/4" phone jack

Standard Software (included with SQM242)

Provides basic setup and deposition control for one or two SQM242 cards.
LabView and Visual Basic programs include source code and ActiveX interface.
Multi-layer process recipes, pre/post conditioning, and digital I/O capabilities are NOT included.

Optional SQS242 Software - P/N 782-SQS-242

Provides complete setup and deposition control for one or two SQM242 cards and one SAM242 card.
Multi-layer process recipes, pre/post conditioning, and digital I/O capabilities are included.

Q–Pod Quartz Crystal Monitor

THE CAPABILITIES OF A TRADITIONAL QCM AT A FRACTION OF THE SIZE AND COST

The INFICON Q-pod™ transducer is a small, inexpensive, accurate way to measure thin film deposition rate and thickness. Setup and operation couldn't be easier. Connect the Q-pod BNC connector to the signal cable from a QCM sensor. On the other side, a standard USB cable connects to your PC. No external oscillator or power source is required. Load the free Q-pod software on your PC and you're ready to go. Q-pod software displays rate, thickness, frequency, crystal life, and a graph of rate versus time, for up to 8 Q-pods simultaneously. Q-pod readings can be logged to disk in spreadsheet friendly comma-delimited format.

Q-POD SOFTWARE

The screenshot at right shows the main setup and operating screen of the software included with the Q-pod. The software supports up to 8 Q-pods on one PC. (Each Q-pod requires one available USB port.)

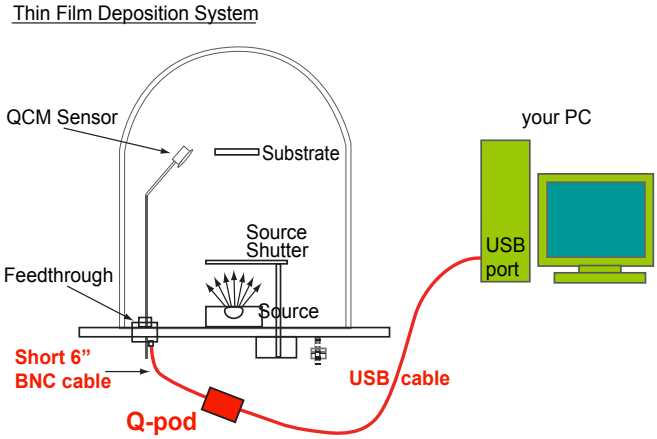
Advantages

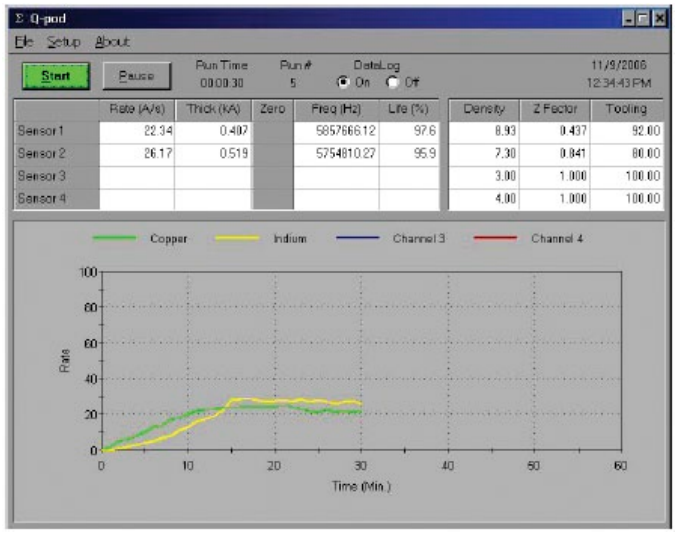
- Simplest and least expensive QCM available anywhere
- Connect directly to your PC's USB ports - up to 8 Q-pods
- Windows®-based software included for operation and data logging
- Weighs less than 2 ounces and small enough to fit in a shirt pocket

Q-POD — A SIMPLE QCM

The block diagram below shows a typical thin film deposition system. A complete Q-pod system consists of Q-pod, a sensor and feedthrough, and a computer.

Typical Q-pod system: Q-pod transducer
sensor
feedthrough, 1" bolt or 2¾" ConFlat
crystals, 10-pack





Q-pod software supports up to 8 Q-pods on one PC.

Q–Pod (continued)

Ordering Information

Q-pod	QCM Transducer, includes:
	- Windows-based software for setup and operation
	- QCM sensor simulator/tester
	- 6" (150mm) BNC cable (connects the Q-pod to the feedthrough)
	- 10' (3m) USB cable (connects the Q-pod to your PC)

A full line of QCM crystals, sensors, feedthroughs, and other accessories are available for use with Q-pod.

Accessories and Replacement Parts

Sensor	Compatible with any QCM sensor
Frequency Range	1 to 10 MHz
Frequency Resolution	0.05 Hz at 6 MHz
Frequency Accuracy	0.002 %
Frequency Stability	± 2 ppm total, over 0º to 50ºC
Input	BNC
Interface & Power	USB, v2.0 or later
Size	1" x 2" x 2.5" (25 x 50 x 64 mm)
Weight	2 oz (32 gm)
Software Included	Provides display and setup of all operating parameters
Computer Requirements	Any PC running Windows® XP or 2000, with one available USB port for each Q-pod

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Electron Impact Emission Spectroscopy

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Guardian™ Co–Deposition Control System

PRECISE CONTROL FOR EMERGING TECHNOLOGIES

Guardian Co-Deposition Controller, powered by electron impact emission spectroscopy (EIES), significantly improves the reproducibility of film quality during fabrication of CIGS films. Guardian provides precise control of deposition rates from 0.1 to 9999 Å/sec. The system operates one or two sensors, up to 8 optical inputs and controls up to 8 deposition sources, enabling co-deposition of up to 8 materials.

The unique Guardian EIES sensor (patent pending) measures deposition rates more accurately without interference from residual gases while monitoring CIGS processes. Its Windows®-based software provides easy setup and operation of multi-material thin film deposition processes. It is fully compatible with INFICON Sentinel® sensors, providing easy integration into existing systems. Guardian Co-Deposition Controller is ideal for controlling simultaneous co-deposition of multiple materials in applications such as CIGS for photovoltaics, MBE, and superconducting thin films.

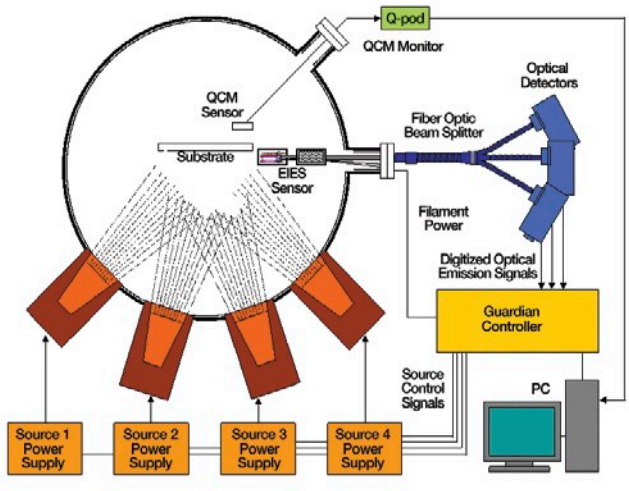


Figure 1 - Conceptual system configuration.

SYSTEM OVERVIEW

A complete Guardian system consists of at least one sensor, one detector, an optical filter, a controller/interface unit, and a PC-compatible computer (user-supplied) with Guardian software. EIES is generally used to control deposition of multiple materials, so most EIES systems include additional sensors, detectors, optical components such as beam splitters, and Quartz Crystal Monitors (QCMs) for calibration or controlling deposition rate for some materials. The block diagram in Figure 1 shows a typical Guardian system configuration. In this system, the Guardian controls the deposition rate of four materials, using EIES for three of the materials and a QCM for the fourth. (A common configuration for deposition of CIGS materials in photovoltaics applications.)

TO CONFIGURE THE GUARDIAN CO-DEPOSITION SYSTEM, CONSIDER THE FOLLOWING

What are the primary and secondary emission wavelengths for your deposition materials? If different materials have peaks too close to each other, you may need to monitor a secondary wavelength, which has lower signal strength. During the deposition process, what background gases are present in your vacuum chamber, and what are the emission wavelengths for those gases? If emissions from background gases interfere with the deposition materials', a gas compensating sensor is recommended. EIES is most effective with the uniquely defined spectra of atomic species. Molecular species that generate

Advantages

- Monitor and control simultaneous deposition of up to 8 materials
- Deposition rates from 0.1 to 9999 Å/sec
- Integrated EIES and QCM thin film process control
- Ideal for CIGS thin films

Guardian (continued)

unstable or broad emission spectra cannot be measured accurately. EIES is not recommended for organic materials. These, and other factors, determine the optimum EIES system configuration for each specific application. Papers have been published that describe these considerations in more detail. When you are configuring your EIES system, please contact us for a thorough discussion of your application.

The standard sensor has one thermionic emitter (filament) positioned near the vapor flux of the materials being deposited. The light generated travels through the light tube to the detector. A filter at the detector inlet passes the specific wavelength of interest. This sensor works well at high vacuum.

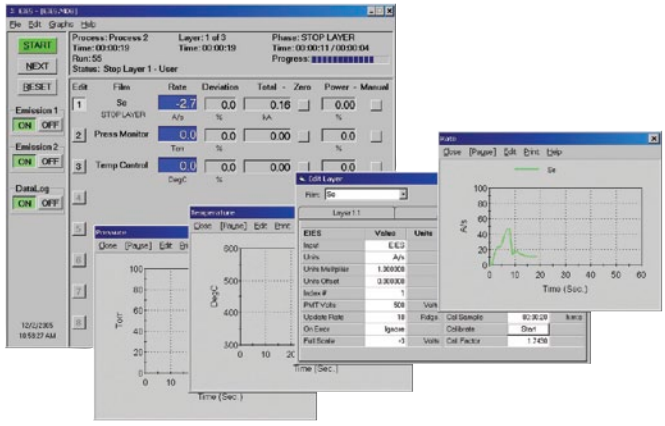
The gas compensation sensor incorporates a second filament in addition to the standard sensor. This second filament is positioned so that it sees only the background gases, not the vapor flux of the materials being deposited. The Guardian software then subtracts the background gases from the signal of interest, significantly improving stability. The gas compensation sensor is recommended when emissions from background gases, such as H_2O & CO_2, interfere with the signal from the material of interest.

The detector uses a photomultiplier tube (PMT) to convert the optical/light signal from the sensor into a high resolution digital signal. A filter at the detector inlet selects the specific material wavelength of interest. The detector inlet has a built-in filter holder for standard 1"(25mm) diameter filters. For a single material system the optical detector module can mount directly on the feedthrough. For multiple materials, a beam splitter can be used to couple the optical signal from one sensor into several detectors. The gain of each detector can be adjusted individually to optimize performance for different materials.

Users familiar with optical beam handling equipment can readily design and build their own beam splitters, using standard components available from many suppliers. For best results, we recommend splitting the main beam into no more than 3 or 4 beams. We offer a fiberoptic beam splitter that splits the main sensor optical beam into 2 to 4 beams. Please contact us with your requirements.

A filter is placed in the inlet of each detector, and blocks all light except one wavelength, which is usually the primary or secondary emission wavelength for the material of interest. Filters with narrow bandwidths reject adjacent wavelengths, but also pass less of the wavelength of interest. Numerous optical filters are available on the market; we offer filters with a good balance between bandwidth and signal levels for most applications.

The Guardian controller provides power for 1 or 2 sensors and up to 8 optical detectors, produces up to 8 source control output signals, and provides digital I/O functions (12 relays, 12 logic inputs). The controller is also the digital interface between all of these functions, and your computer. Two controller models are available: The basic controller (782-900-031) operates one sensor, the other (782-900-050) runs two. Both models operate standard or gas compensation sensors.



Guardian software provides all of the functions required for an eight sensor, eight output, multi-layer co-deposition controller. Process settings, numeric data, and graphs can be displayed during all phases of deposition.

The final component of an EIES system is your computer and the Guardian software supplied with every controller. The software provides everything you need to setup and operate the EIES system, and run a multi-material thin film deposition process.

The software integrates a QCM, such as Q-pod transducer or SQM-242 card, for calibration of the EIES to a QCM reference, or for deposition control. The SQM-242 and SAM-242 option cards can also be used for calibration and control of analog devices.

Guardian (continued)

HOW ELECTRON IMPACT EMISSION SPECTROSCOPY WORKS

Guardian is powered by Electron Impact Emission Spectroscopy (EIES), a highly advanced method of controlling thin film properties during deposition of multiple films. The material being deposited is excited by a thermionic emitter, which results in creation of photons. The light created passes through an optical filter to a photomultiplier tube (PMT) detector, which measures the intensity of emission of the passed wavelength. Guardian then generates a signal to control the source for that material. Additional detectors, with appropriate optical filters, are used for multiple materials.

Specifications

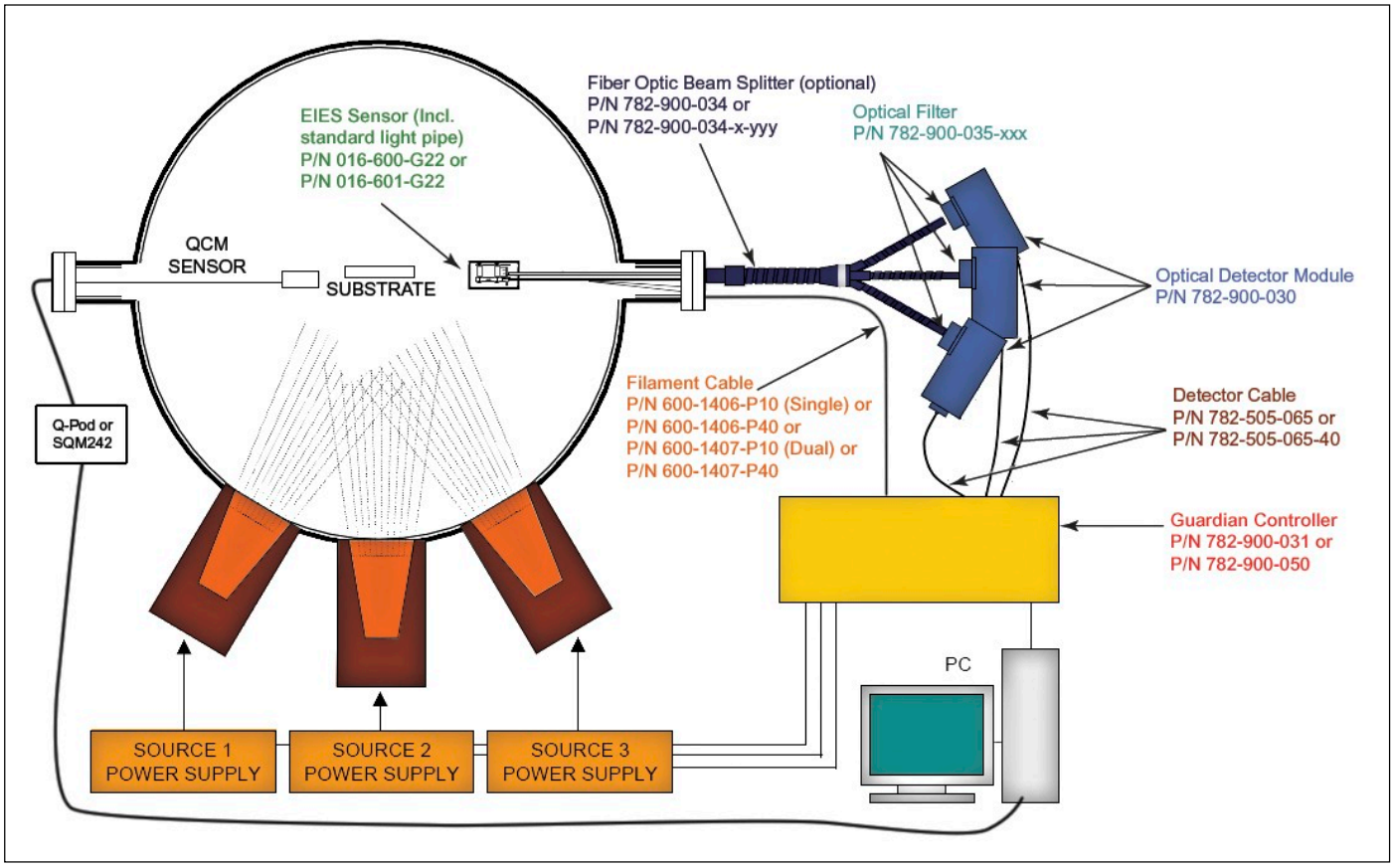
Sensors		Guardian Sensor Patent #7,719,681
Operating Pressure		< $5x10^{-4}$ Torr
Temperature		450°C maximum during operation and/or bakeout
Size (approximate)		$^3/_4$" x $1^1/_4$" x $1^3/_4$" (19 x 32 x 45 mm)
Filament Life (typical)		~1000 hours
Sensor-Feedthrough Linkage		rigid ss tube, adjustable from 7" - 22" (175mm - 550 mm)
Feedthrough / Flange		one optical and four electrical feedthroughs on $2^3/_4$"CF (NW35CF)
Detector		
Photomultiplier Tube (PMT)		Hamamatsu R7518 or equivalent
Spectral Response		185 to 730 nm
Detection Limit		better than 5 fW of optical input power
PMT Gain		10^3 to 10^7 (detectors are independently adjustable)
Output Resolution		20-bit
Optical Entrance Port		built-in filter holder, for filters up to 1" (25mm) diameter and 0.2" (5mm) thick
Size		2" x 5.5" x 2.75" (50 x 140 x 70 mm) mounting holes on 3 sides (optional mounting brackets available)
Controllers		782-900-031: operates one sensor 782-900-050: operates one or two sensors
Sensors		016-600-G22: Standard Sensor Assembly 22" 016-601-G22: Gas Compensating Sensor Assembly 22"
Detectors		8 optical detector channels
Control Outputs		8 source control outputs, 0 to ±10 VDC programmable
Digital I/O		12 relay outputs and 12 logic inputs
Power		100-240 VAC, 50/60Hz, 150W
Size		19" x 3.5" x 12" (483 x 89 x 305 mm)
Compliance		CE
User Interface	software:	Windows® based setup program included with Controller
Software Displays	deposition rate:	4-digit numeric display of all channels, from 0.001 to 9999 Å/s, and graphical X-Y scrolling plot with selectable scales.
	thickness:	4-digit numeric display with range selection, from 0.001 to 9999 KÅ
Computer		
	user-supplied:	any PC with Windows® Vista/XP/2000 operating system, and Ethernet or RS-232 interface

Guardian (continued)

Configuration Guide

Guardian uses EIES (Electron Impact Emission Spectroscopy) technology to detect and monitor the deposition of thin films. It is especially useful for CIGS applications. A complete Guardian system includes a Guardian controller, an EIES Sensor with the appropriate filament cable, and an Optical Detector with the appropriate detector cable and filter. Up to four materials can be monitored at once with a single sensor (8 materials for two sensors) using the optional beam splitter and the appropriate number of detectors. Guardian can also be paired with a Q-pod or SQM242 QCM system for automatic calibration through the Guardian software.

The following guide will help you select the options and accessories needed to build a complete Guardian system.



Guardian (continued)

Ordering Information

	Guardian Controller (choose one)
782-900-031	**Guardian Controller for One Sensor (Standard or Gas Compensating)**
	Guardian EIES Controller with one sensor input. This will work with either a standard or gas compensating sensor.
782-900-050	**Guardian Controller for Two Sensors (Standard or Gas Compensating)**
	Guardian EIES Controller with two sensor inputs. This will work with either a standard or gas compensating sensor in each of two inputs.
	EIES Sensor (choose one)
016-600-G22	**Guardian Standard Single 4 mA Sensor & Feedthrough Assembly, 22" (539 mm), CF40 flange**
	Standard EIES single sensor. Includes CF40 (2¾" ConFlat) feedthrough assembly and in-vacuum hardware, standard 20" (508 mm) light pipe and in-vacuum EIES cable, 22" (539 mm). Other lengths available on request, min. 6.25" (159 mm), max. 32" (813 mm).
016-601-G22	**Guardian Gas Compensating 4 mA Sensor & Feedthrough Assembly, 22" (539 mm), CF40 flange**
	Gas compensating EIES sensor. Uses an additional filament to subtract the signal emitted by residual gas to achieve an accurate baseline. Detects materials that have difficulty when using a standard single sensor due to residual gas. Other lengths available on request, min. 9" (229 mm), max. 34.6" (879 mm).
	Beam Splitter (optional)
782-900-034	**Guardian Fiber Optic Beam Splitter (1:3) - 400 mm length**
	Splits the light beam from the sensor into 3 separate beams. Allows the detection of 3 materials from the same sensor. An optical detector and optical filter must be attached to each of the 3 ends.
782-900-034-x-yyy	**Guardian Fiber Optic Beam Splitter (1:x) - yyy mm length**
	A custom version of the standard beam splitter. The x value determines how many ways the beam is split (2 or 4 are the choices) and yyy determines the length of the splitter (400 mm is typical).
	Filament Cable (choose one per sensor) New design attaches securely to feedthrough.
	Cable that connects a standard single sensor feedthrough to the Guardian Controller.
600-1406-P10	Guardian Single Filament Cable, 10' (3m)
600-1406-P40	Guardian Single Filament Cable, 40' (12m)
	Cable that connects a gas compensating sensor feedthrough to the Guardian Controller.
600-1407-P10	Guardian Dual Filament Cable, 10' (3m)
600-1407-P40	Guardian Dual Filament Cable, 40' (12m)
	Optical Detector (select appropriate quantity)
782-900-030	**Guardian Optical Detector Module**
	Works in conjunction with an optical filter to isolate and detect the light from the sensor for a given material being deposited. Optical filters sold separately.
	Optical Detector Cable (select appropriate quantity and length)
	Cable that connects the optical detector to the Guardian.
782-505-065	Guardian Detector Cable, 10' (3m)
782-505-065-40	Guardian Detector Cable, 40' (12m)

Guardian (continued)

Ordering Information (continued)

	Guardian EIES Optical Filters (select appropriate quantity and wavelength)
	Filters the beam of light received by the optical detector to single out a specified wavelength. This allows the Guardian to monitor the specific material being deposited. Other filters available on request.
782-900-035-202	Guardian Optical Filter - Center Wavelength - 202nm (Zn)
782-900-035-241	Guardian Optical Filter - Center Wavelength - 241nm (Co)
782-900-035-252	Guardian Optical Filter - Center Wavelength - 252nm (Si)
782-900-035-265	Guardian Optical Filter - Center Wavelength - 265nm (Ge, Pt, Ta, Ir)
782-900-035-267	Guardian Optical Filter - Center Wavelength - 267nm (Au)
782-900-035-294	Guardian Optical Filter - Center Wavelength - 294nm (Hf)
	(Ga [when using a gas compensating sensor])
782-900-035-304	Guardian Optical Filter - Center Wavelength - 304nm
	(Ba, In [when using a gas compensating sensor])
782-900-035-325	Guardian Optical Filter - Center Wavelength - 325nm (Cu, Cd, Ag)
782-900-035-358	Guardian Optical Filter - Center Wavelength - 358nm (Nb, U, Cr)
782-900-035-364	Guardian Optical Filter - Center Wavelength - 364nm (Ti, Pb)
782-900-035-396	Guardian Optical Filter - Center Wavelength - 396nm (Al)
782-900-035-417	Guardian Optical Filter - Center Wavelength - 417nm (Ga)
782-900-035-451	Guardian Optical Filter - Center Wavelength - 451nm (In)
782-900-035-460	Guardian Optical Filter - Center Wavelength - 460nm (Sr)
782-900-070	**Monochromator** Adjustable optical filter that allows the user to specify which wavelength to single out. Adjustable from 200 - 800nm.
	Replacement Parts for New 4 mA Sensors and Feedthrough Assembly 016-600-Gxx and -601-Gxx
016-400-G1	4 mA Flux Sensor, High Rate for 016-600-Gxx Sensor and Feedthrough Assembly
016-400-G2	4 mA Flux Sensor, Standard Rate for 016-600-Gxx Sensor and Feedthrough Assembly
016-400-G5	4 mA Gas Sensor, for 016-601-Gxx Sensor and Feedthrough Assembly
016-400-G6	4 mA Flux Sensor, for 016-601-Gxx Sensor and Feedthrough Assembly
016-201-G1	Emitter Assembly for all 016-400-Gx Sensors used in 016-600-Gxx and -601-Gxx
782-900-038	**Guardian Photomultiplier Tube Replacement** Replaces the Photomultiplier tube in the optical detector.
016-509-G22	**Guardian 4 mA Sensor EIES In-vacuum Cable, 22" (559 mm), other lengths available** A gas compensating sensor uses two cables. For retrofit to new 4 mA sensors.
	Replacement Part for Discontinued Sensors
782-530-015	**Guardian Sensor Filament Replacement (for discontinued 782-900-036 and -056 sensors)** Replacement filaments for EIES sensors. A gas compensating sensor uses two filaments.

Quartz Crystal Sensors and Feedthroughs

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Front Load Single Sensor

INFICON Front Load Single crystal sensors offer proven reliability and durability and have the best thermal stability of any sensor head on the market. The front load design allows for easy insertion of the crystal holder in applications lacking sufficient room for side insertion. Assembled mechanically rather than soldered, parts can be replaced conveniently in the field, if necessary. Sensors can be ordered individually or in a sensor / feedthrough combination that can be either welded or assembled with compression fittings.

Sensor Configurations

Two sensor configurations are offered: The standard version and the right angle (compact) version. The standard version is designed for installation from the side or bottom of the chamber having the cooling tubes parallel to the crystal face. The right angle version is designed for installation through the top of the vacuum system having the water cooling tubes perpendicular to the crystal face. Optionally, sensors can be ordered with a pneumatically driven crystal shutter to protect the crystal during source warm up, when not used during deposition of an alternate material, or to extend crystal life when used with RateWatcher™. The shutter is designed to flip down allowing easy crystal replacement.

The exposed crystal electrode is fully grounded to effectively eliminate problems due to RF interference.

Feedthroughs

INFICON offers two types of feedthroughs, either a 1 inch bolt feedthrough or a 2¾ inch (CF40) ConFlat® flange feedthrough. KF40 feedthroughs are available on request.

Feedthrough Connection

Front Load Single sensors can be ordered in combination with a feedthrough. The sensor / feedthrough connection can be either welded or made with compression fittings. Compression fittings allow for easy adjustability without the need for brazing or welding. The feedthrough can be moved along the length of the tubes allowing the length inside the vacuum systems to be adjusted over a range of 20.3 to 71.1 cm (8 to 28 inches) for "E" length sensors and 20.3 cm to 121.9 cm (8 to 48 inches) for "G" length sensors. Once the desired length is determined, the compression fittings allow for a finger tight tube seal. Alternately, a welded connection may be chosen. If a welded connection is desired, a sensor length specification form, provided by INFICON, must be completed prior to ordering and submitted with the order.

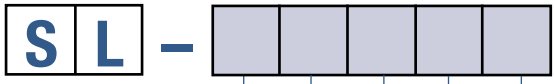
Advantages

- Front load crystal holder
- Easy installation
- Available with
  - 2.54 cm (1 inch) bolt feedthrough
  - CF40 feedthrough
- Adjustable length if ordered with compression fittings
- Sensor / Feedthrough combinations available welded to customer specified lengths
- No brazing required if ordered with compression fittings or welded to feedthrough

Front Load Single Sensor (continued)

Ordering Information

Front Load Single Sensor (with in-vacuum cables)



Type of sensor (includes in-vacuum Cable, Crystal Snatcher and User Manual. Crystals sold separately)

Standard Sensor (water lines parallel)	A
Right Angle Sensor (water lines perpendicular)	B

Shutter Assembly - SEE NOTE 4

None	0
Standard shutter	1

Length of Sensor - SEE NOTES 1 and 3

Standard length - 203mm (8") to 711 mm (28") Includes 781 mm (30.75") In-vacuum cable. **SEE NOTE 6**	E
Extended length - Greater than 711 mm (28"); maximum 1219 mm (48") Includes 781 mm (30.75") In-vacuum cable. **SEE NOTE 6**	G

Feedthrough Connection - SEE NOTE 4

0	Sensor not connection to Feedthrough
7	Sensor Welded to Feedthrough
8	Variable length with Ultra-Torr® compression fittings. (Allows the sensor length to be variable by using Ultra-Torr compression fittings)

Feedthrough - SEE NOTE 2

0	None
3	1" bolt
4	CF40

The following combinations are not available (SEE NOTES 4 and 5): SL-A1E38, SL-A1G38, SL-B1E38, SL-B1G38, SL-A1E47, SL-A1G47, SL-B1E47, SL-B1G47

Custom parts, special bends and other non-standard parts available - Consult factory

NOTE 1:
Orders for sensors welded to feedthroughs will be entered once INFICON receives customer signed off dimensional drawing. Once special length or manufactured order is confirmed, it is not cancelable. INFICON will provide a sensor length specification form.

NOTE 2:
Feedthrough configuration varies depending on options selected (with or without shutter, type of feedthrough, etc). Example: SL-A0E37 uses feedthrough p/n 002-042 while SL-A1E37 uses feedthrough p/n 750-030-G1.

NOTE 3:
Sensor lengths are measured from center of the crystal to the vacuum side (sealing surface) of the feedthrough (see drawing).

NOTE 4:
Sensors ordered with shutters and 1" bolt style feedthrough can only be welded (compression fittings not available).

NOTE 5:
Front Load sensors ordered with a CF40 feedthrough and a shutter cannot be welded due to dimensional limits of the CF40.

NOTE 6:
For sensors ordered without a weld connection (option "0" or "8"), tubes are made to a length of 30" (762mm) for "E" length and 48" (1219mm) for "G" length sensors.

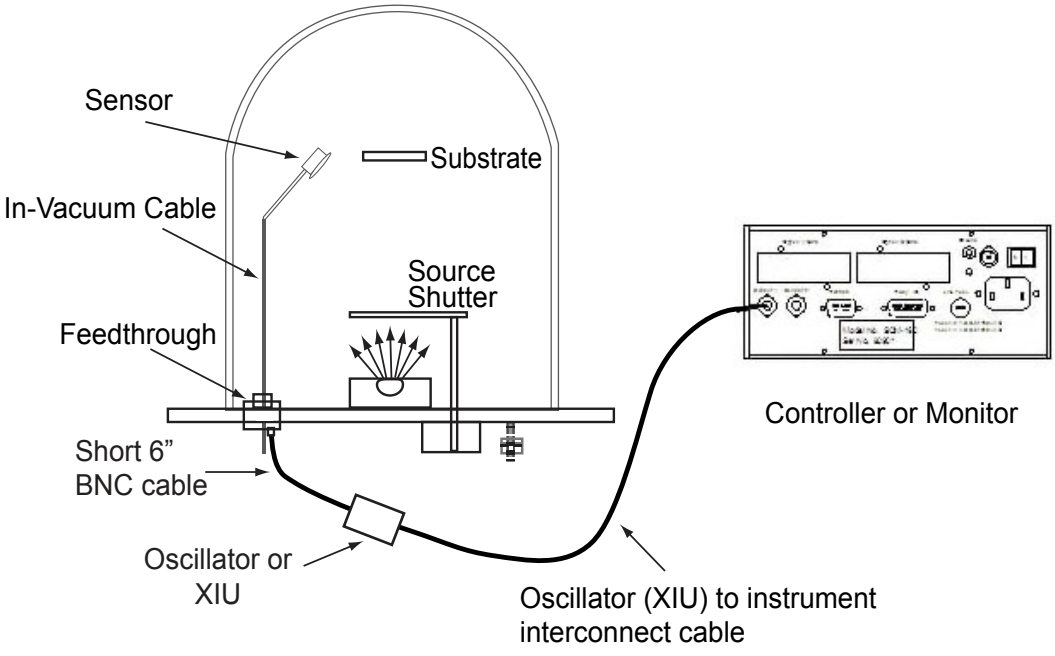
Operation with a 60" (1524 mm) cable may require a special oscillator.

Front Load Single Sensor (continued)

Specifications

SL-A _ _ _ _ Series Standard Single Sensor

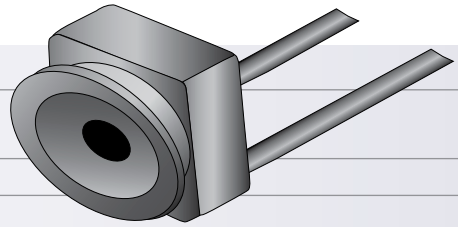
Maximum bakeout temp with no water	130°C
Maximum operating isothermal environment temperature with minimum water flow	400°C
SL-A Size (maximum envelope without shutter)	1.063" x 2.42" x 0.69" (27 mm x 61.47 mm x 17.53 cm)
Water tube	1/8" (3.175 mm) O.D. seamless stainless steel
Crystal exchange	Front loading; self-contained package for ease of exchange
Mounting	Two #4-40 tapped holes on the back of the sensor body
Installation Requirements	
Feedthrough	2 pass water 3/16" (4.8 mm) O.D. tubing with Microdot® coax connector
Water flow rate	Minimum water flow 150-200 cc/min, 30°C max (Do not allow to freeze)
Water quality	Coolant should not contain chlorides as stress corrosion cracking may occur Extremely dirty water may result in loss of cooling capacity
Materials	
Body and holder	304 type stainless steel
Springs, electrical contacts	Au plated Be-Cu
Water tubes	S-304, 0.125" (3.175 mm) O.D. x 0.015" (0.381 mm) wall thickness seamless stainless steel tubing
Connector (Microdot)	Stainless steel, Teflon® and glass insulated
Insulators	>99% Al_2O_3
Wire	Teflon insulated copper
Braze	Vacuum process high temperature Ni-Cr alloy
Crystal	0.550" (13.97 mm) Diameter



Front Load Single Sensor (continued)

Specifications

SL-B _ _ _ _ Series Right Angle Single Sensor Specifications



Maximum bakeout temp with no water	130°C
Maximum operating isothermal environment temperature with minimum water flow	400°C
SL-B _ _ _ _ Size	1.11" x 1.06" x 1.06"
(maximum envelope without shutter)	(28.19 mm x 26.92 mm x 26.92 mm
Water tube	1/8" (3.175 mm) O.D. seamless stainless steel
Crystal exchange	Front loading; self-contained package for ease of exchange
Mounting	Two #4-40 tapped holes on the back of the sensor body
Installation Requirements	
Feedthrough	2 pass water 3/16" (4.8 mm) O.D. tubing with Microdot® coax connector
Other	XIU or Oscillator to match specific controller, valve assembly 750-420-G1 for shuttered sensors
Water flow rate	Minimum water flow 150-200 cc/min, 30°C max
Water quality	Coolant should not contain chlorides as stress corrosion cracking may occur. Extremely dirty water may result in loss of cooling capacity
Materials	
Body and holder	304 type stainless steel
Springs, electrical contacts	Au plated Be-Cu
Water tubes	S-304, 0.125" (3.175 mm) O.D. x 0.015" (0.381 mm) wall thickness seamless stainless steel tubing
Connector (Microdot)	Stainless steel, Teflon® and glass insulated
Insulators	>99% Al_2O_3
Wire	Teflon insulated copper
Braze	Vacuum process high temperature Ni-Cr alloy
Crystal	0.550" (13.97 mm) Diameter

Specifications

Feedthrough Specifications

NOTE: Sensor / Feedthrough combination specifications are determined by lowest component specification

1 inch bolt and compression fitting terminations:	
Materials	304 stainless steel, Teflon®, ceramic, beryllium nickel, VITON®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture
CF 40 welded terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2 3/4" ConFlat type flanges with 1.375" I.D. min.

Front Load Single Sensor (continued)

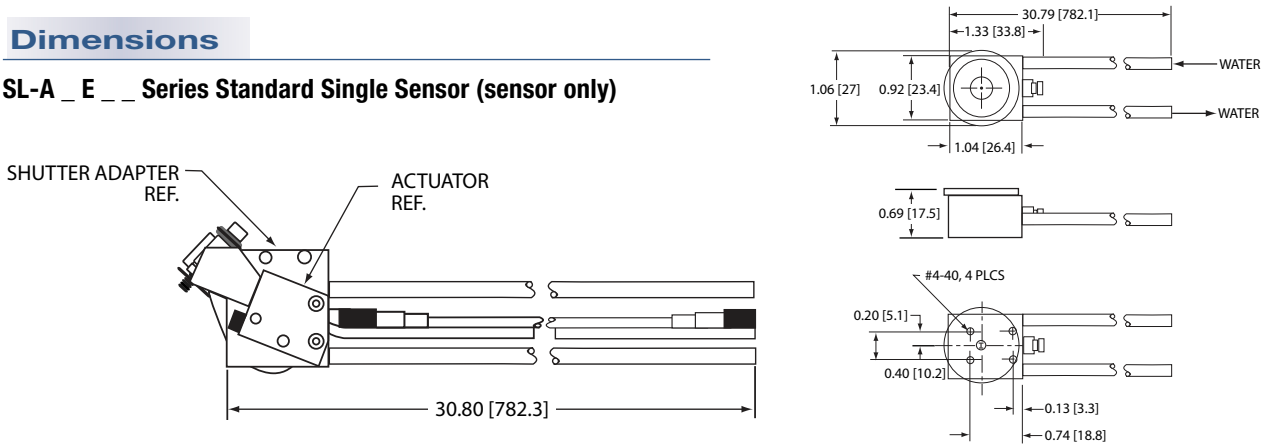
Spare Parts List

P/N	Description
007-007	Retainer Spring (for Crystal Holder)
007-023	Ceramic Retainer
007-044	In-Vacuum Cable, 30.75 in./ 78.1cm
080-018	Set Screw (for Female Coax)
082-044	Teflon Screw (for Leaf Spring)
750-115-P4	Coupling (for Bellows Assembly)
750-169-P2	Bellows Assembly (Coupling not included)
750-171-P1	Finger Spring Contact
321-039-G13	In-Vacuum cable, 60" (154.2 cm)

P/N	Description
750-172-G1	Crystal Holder (includes Retainer Spring)
750-174-P2	Female Coax
750-175-P1	Insulator (underneath Leaf Spring)
750-188-P2	Leaf Spring
750-210-G1	Shutter Module (Bellows Assembly, Shaft Assembly, and Shutter Assembly)
750-215-G1	Shaft Assembly (part of Shutter Module)
750-216-G1	Shutter Assembly (part of Shutter Module)

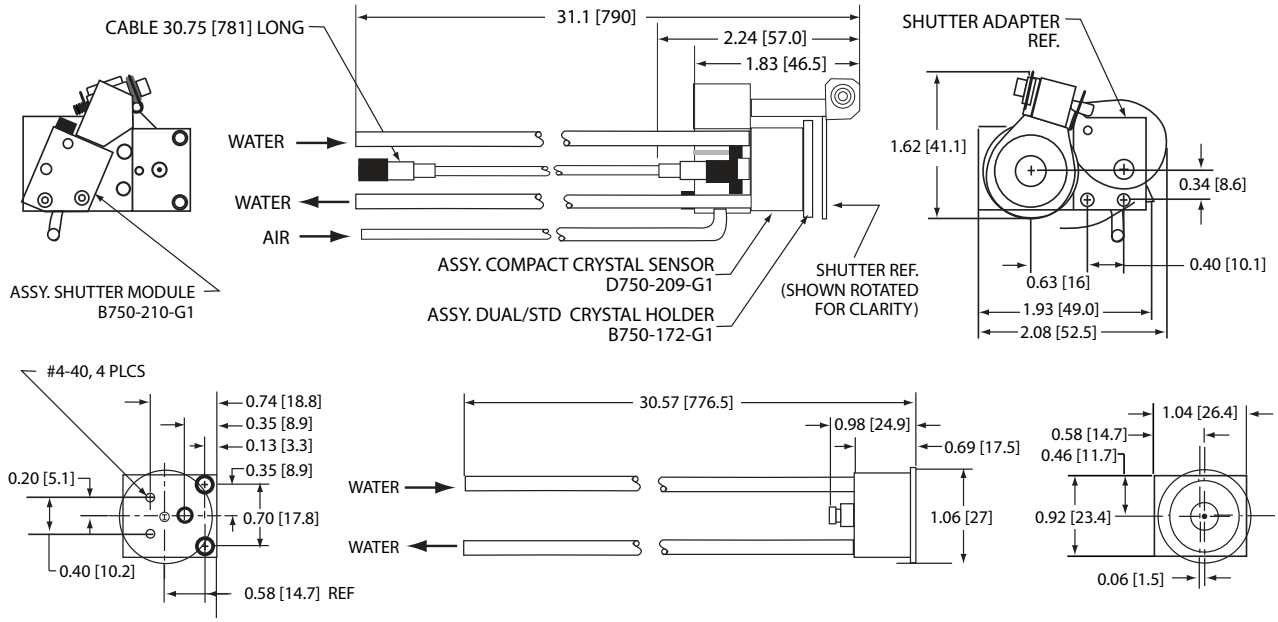
Dimensions

SL-A _ E _ _ Series Standard Single Sensor (sensor only)



Dimensions

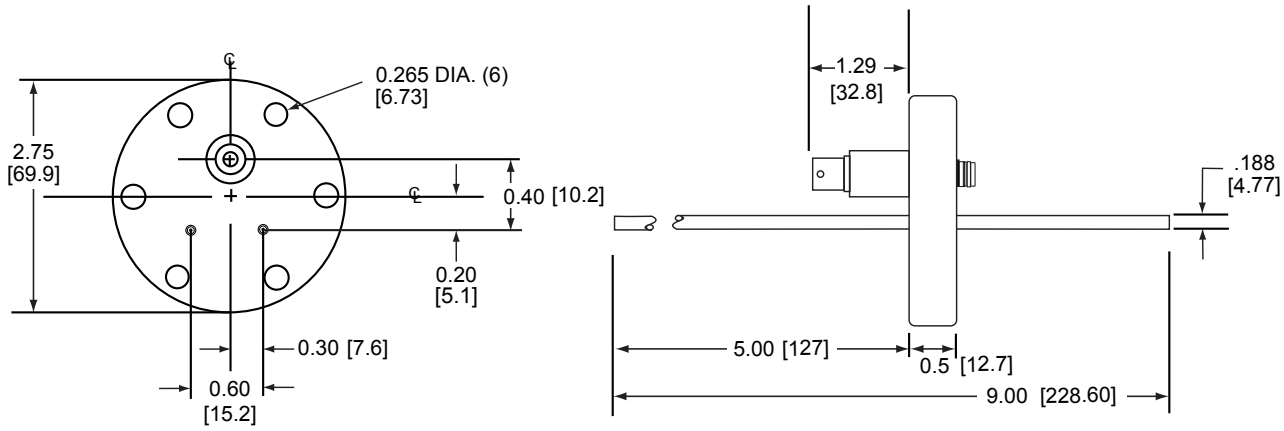
SL-B _ E _ _ Series Right Angle Single Sensor (sensor only)



Front Load Single Sensor (continued)

Dimensions

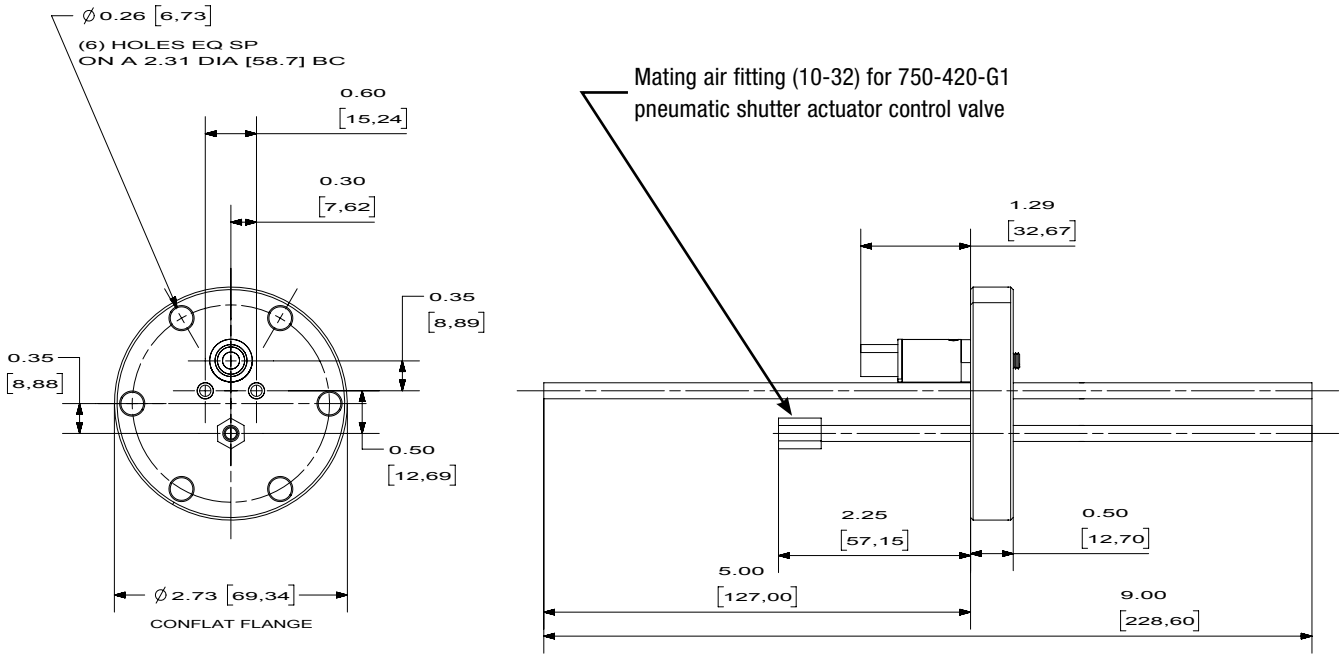
Feedthrough used for SL-A0_47, SL-A0_40, SL-B0_47, and SL-B0_40 Sensor / Feedthrough Combinations



Note: Metric dimensions are for reference only.

Dimensions

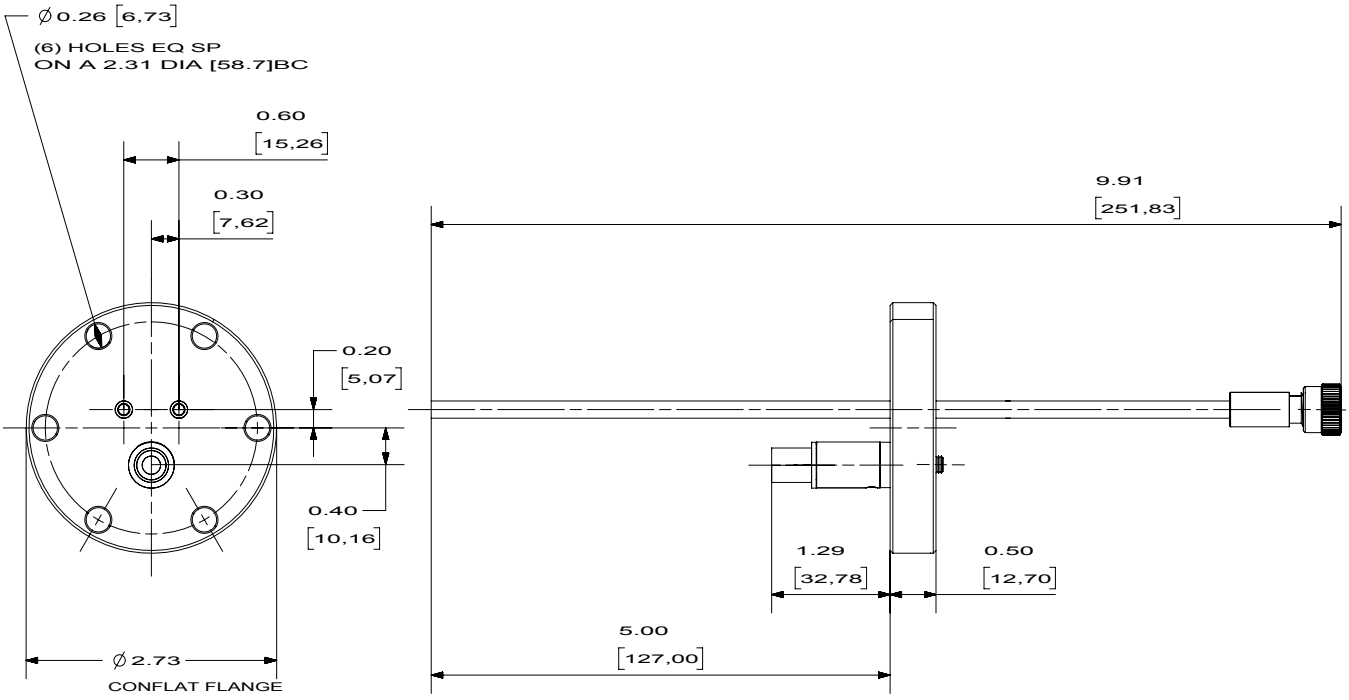
Feedthrough used for SL-A1_40 and SL-B1_40 Sensor / Feedthrough Combinations



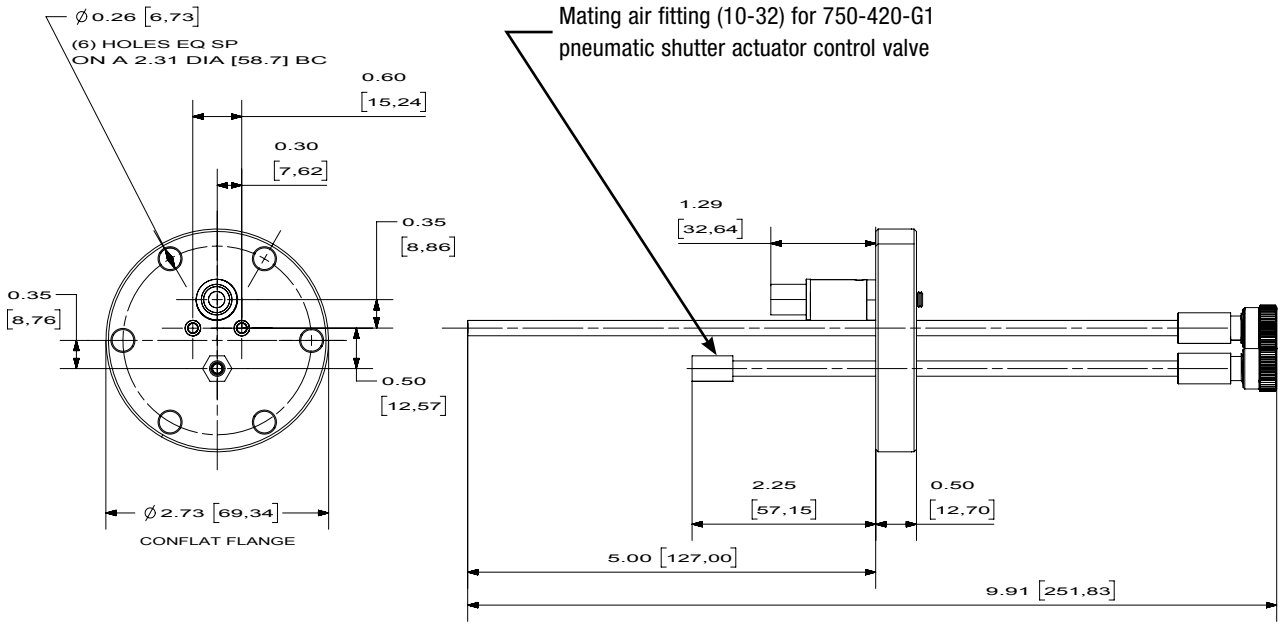
Front Load Single Sensor (continued)

Dimensions

Feedthrough used for SL-A0_48 and SL-B0_48 Sensor / Feedthrough Combinations



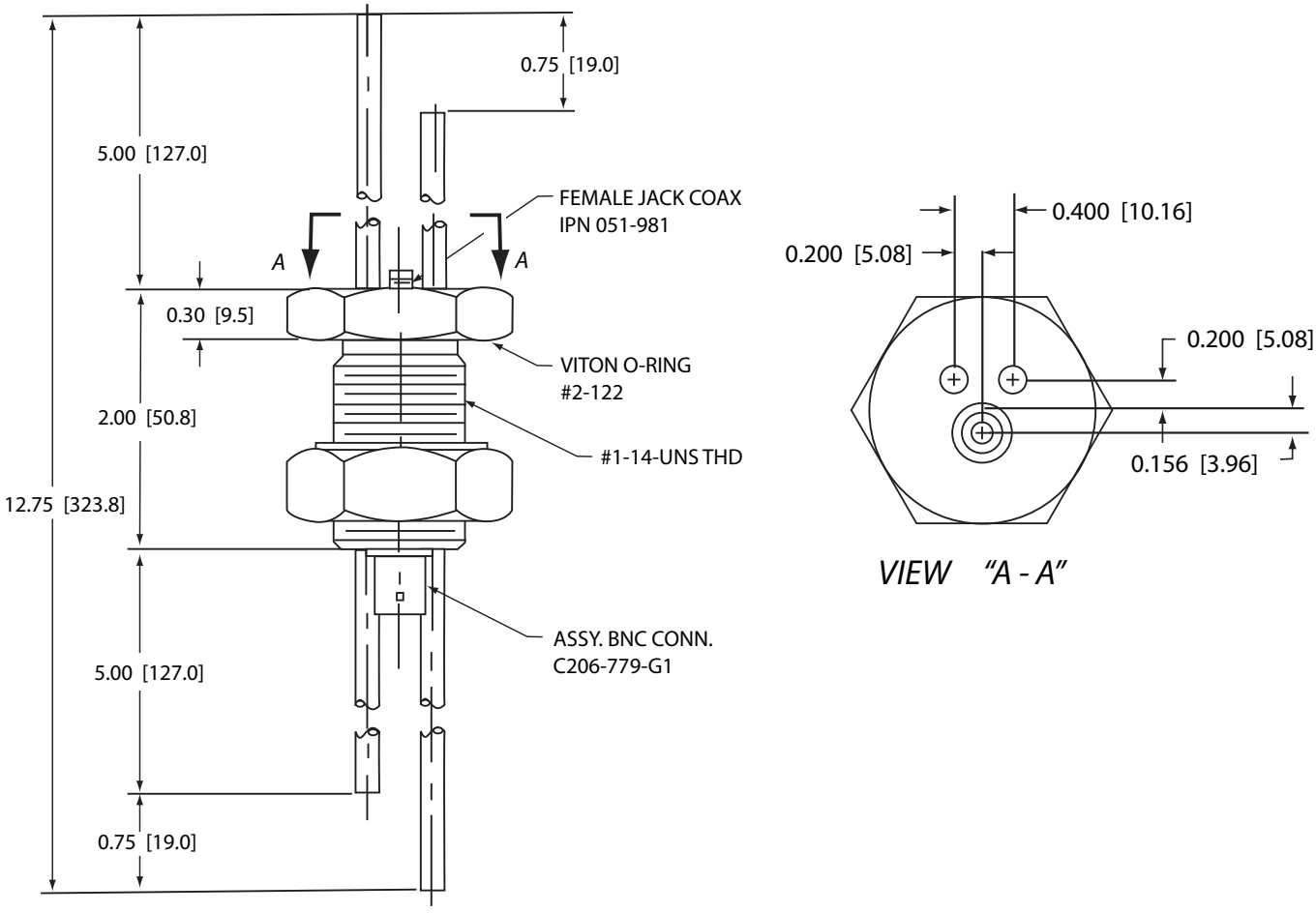
Feedthrough used for SL-A1_48 and SL-B1_48 Sensor / Feedthrough Combinations



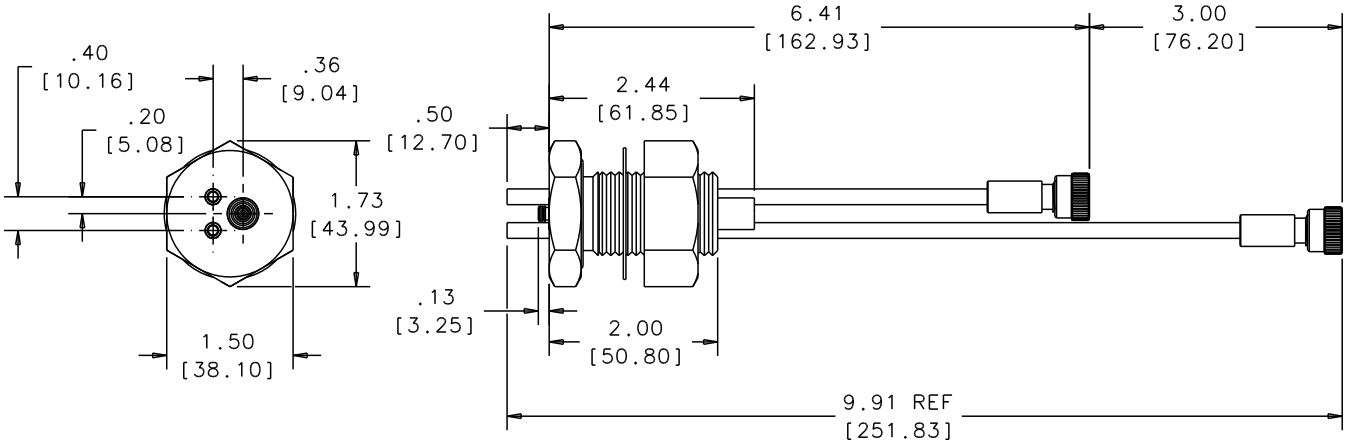
Front Load Single Sensor (continued)

Dimensions

Feedthrough used for SL-A0_37, SL-B0_37, SL-A0_30 and SL-B0_30 Sensor / Feedthrough Combinations



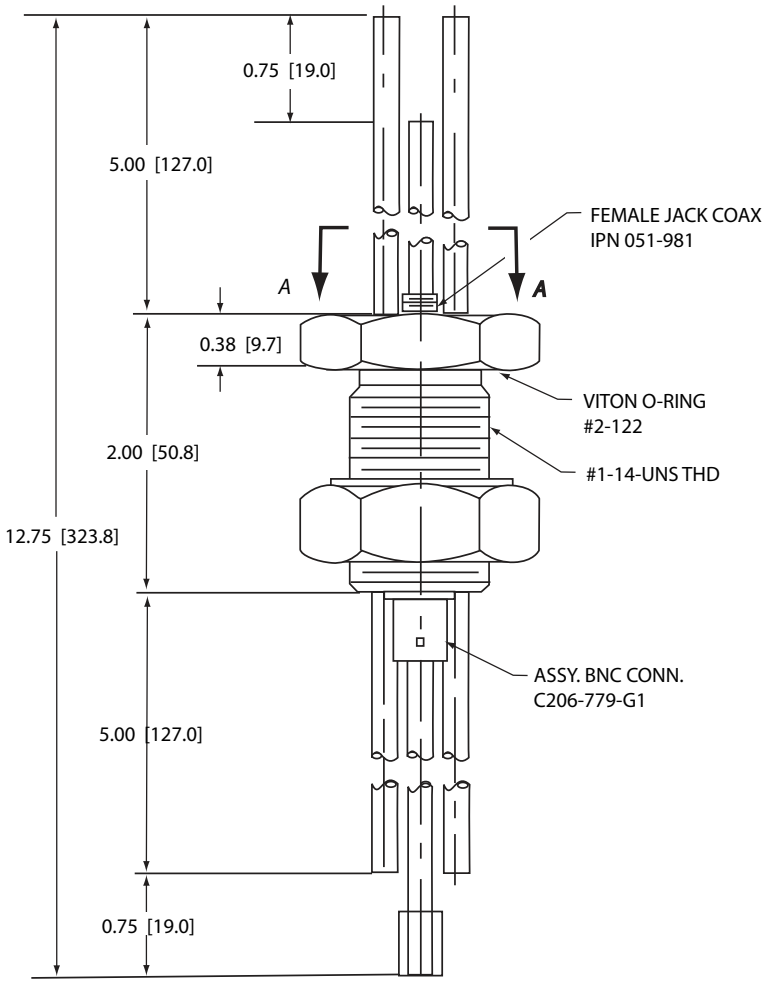
Feedthrough used for SL-A0_38 and SL-B0_38 Sensor / Feedthrough Combinations

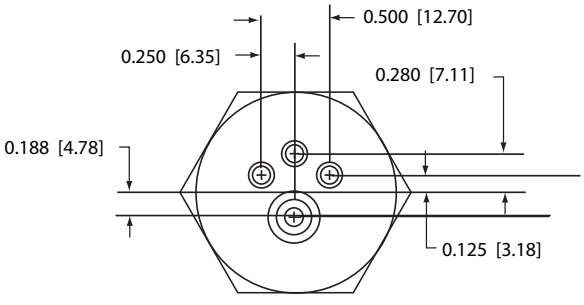


Front Load Single Sensor (continued)

Dimensions

Feedthrough used for SL-A1_37, SL-B1_37, SL-A1_30 and SL-B1_30 Sensor / Feedthrough Combinations



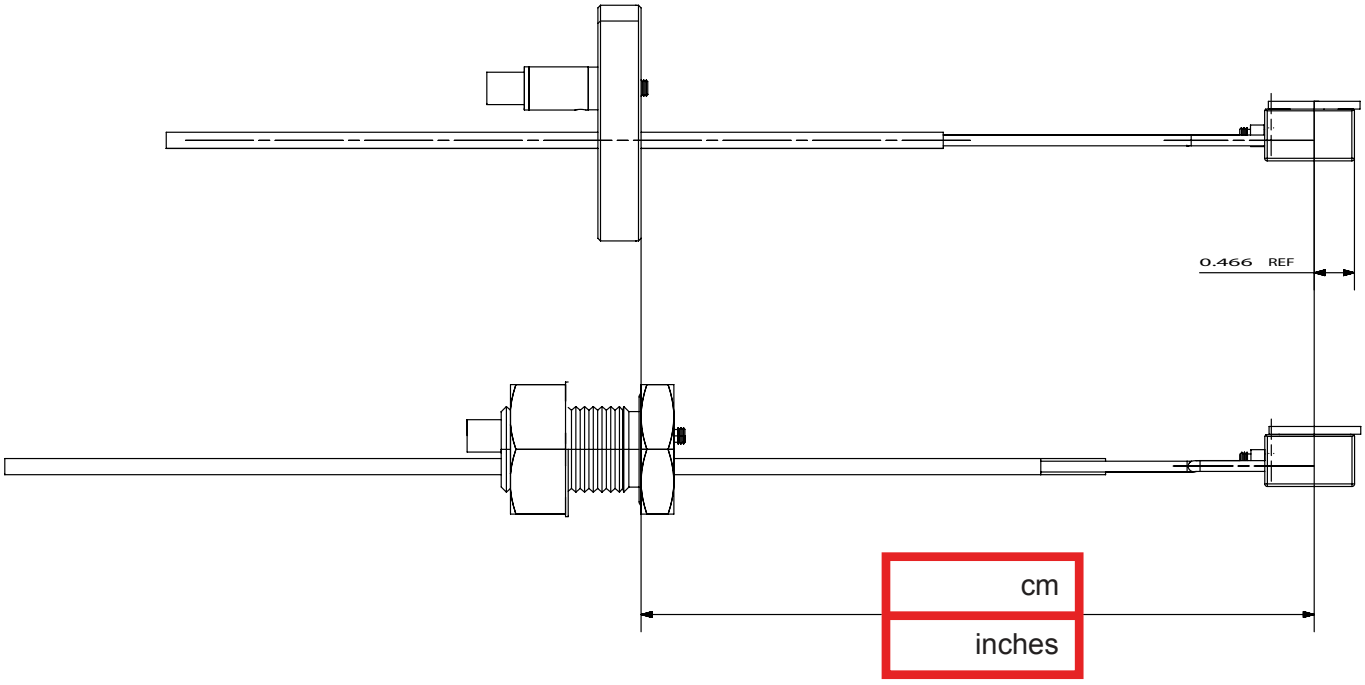


VIEW "A - A"

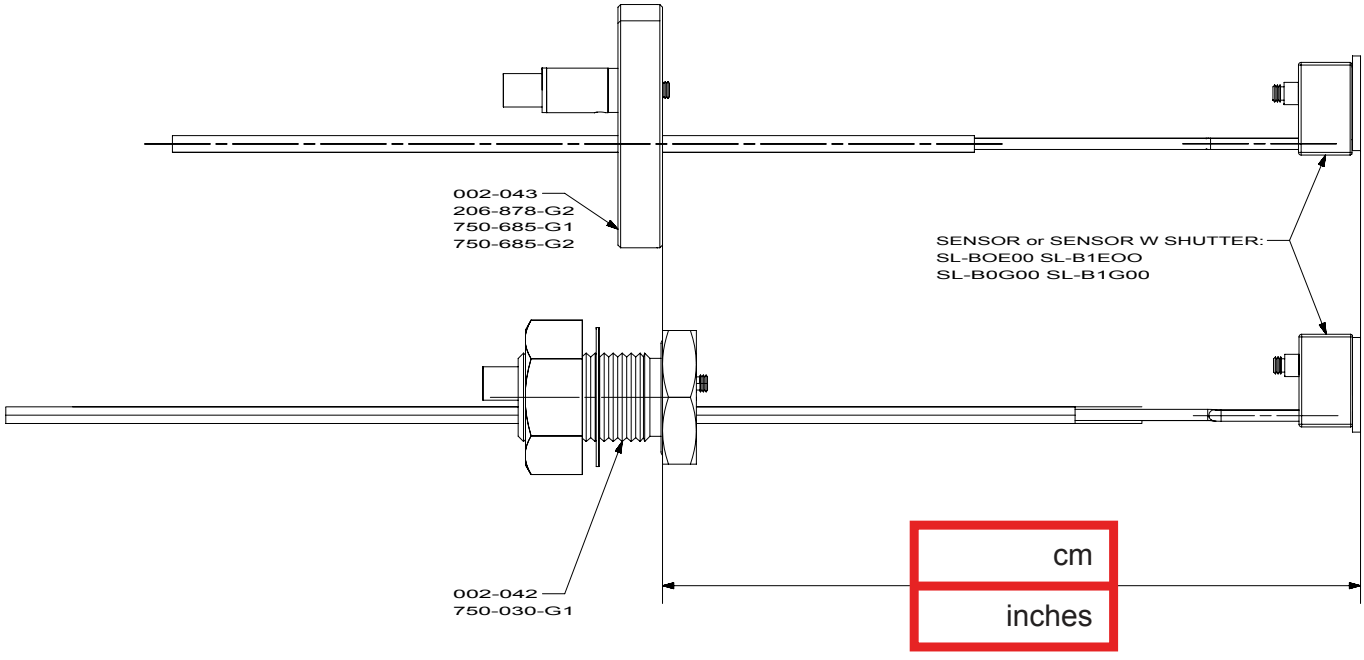
Front Load Single Sensor (continued)

Dimensions

Sensor Length Specification for SL-A_ _ _ _ Sensor / Feedthrough Combinations



Sensor Length Specification for SL-B_ _ _ _ Sensor / Feedthrough Combinations



Cool Drawer Single Sensor

The Cool Drawer™ Single Sensors allow crystal installation into the sensor from the side, convenient for systems with insufficient room for front load crystal installation. The Cool Drawer Single Sensor employs the Cool Drawer Crystal Holder which is thermally shielded by the water-cooled housing insuring excellent crystal performance.

SENSOR CONFIGURATIONS

Two sensor configurations are offered: The standard version and the right angle version. The standard version is designed for installation from the side or bottom of the chamber and the cooling tubes and the crystal face are parallel. The right angle version is designed for installation through the top of the vacuum system and the water cooling tubes are perpendicular to the crystal face. Both versions are available with or without a crystal shutter.

The exposed crystal electrode is fully grounded to effectively eliminate problems due to RF interference. The housing is provided with (2) tapped (4-40) holes for convenient mounting.

FEEDTHROUGHS

INFICON offers two choices for feedthrough connection types: either a 1" bolt feedthrough or a 2¾" ConFlat® feedthrough.

FEEDTHROUGH CONNECTIONS

Cool Drawer single sensors must be ordered in combination with a feedthrough. The sensor / feedthrough connection can be either welded or made with compression fittings.

Compression fittings allow for easy adjustability without the need for brazing or welding. The feedthrough can be moved along the length of the tubes allowing the length inside the vacuum system to be adjusted over a range of 10 to 66 cm (4" to 26"). Once the desired length is determined, the compression fittings allow for a finger tight tube seal.

When selected with the welded CF40, the sensor is designed for high temperature processes where reliability is critical. Constructed of stainless steel and ceramic materials it is suitable for applications requiring high temperature bakeout (see specifications).

Advantages

- No internal cables
- Cool Drawer crystal holder
- Easy installation
- Bakeable if ordered with welded CF40 flange
- Available with:
  - CF40 feedthrough
  - 2.54 cm (1") bolt feedthrough
- Adjustable length if ordered with compression fittings
- No brazing required if ordered with compression fittings
- Sensor / Feedthrough combinations available welded to customer specified lengths

Cool Drawer Single Sensor (continued)

Ordering Information

Cool Drawer Single Sensor (with conductor tube)

C	D	S	–					

Type of sensor (Crystals sold separately)

Standard Cool Drawer (water lines parallel to crystal face)	A
Right Angle Cool Drawer (water lines perpendicular to crystal face)	B

Shutter Assembly

None	0
Standard shutter	1

Length of Sensor - SEE NOTE 1

Length - (minimum 102 mm (4") to 660 mm (26"))	F

Feedthrough Connection

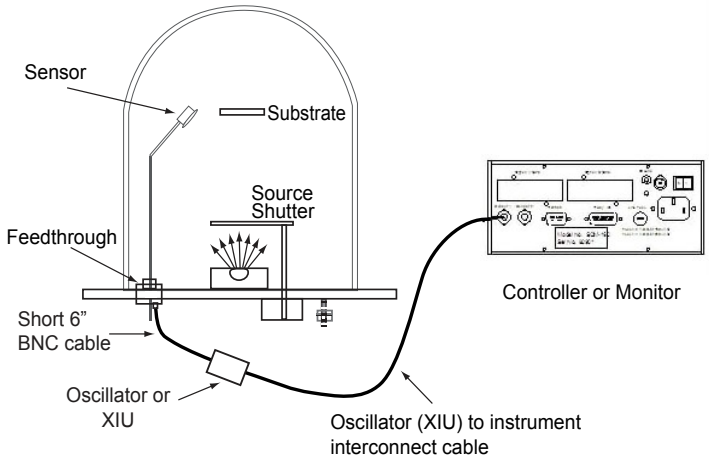
7	Sensor Welded to Feedthrough - **SEE NOTE 3**
8	Variable length with Ultra-Torr® compression fittings. (Allows the sensor length to be variable by using Ultra-Torr compression fittings) Not available with CF40 feedthrough and shutter combination.

Feedthrough - SEE NOTE 2

3	1" bolt
4	CF40

The following combinations are not available:
CDS-A1F48, CDS-B1F48

Custom parts, special bends and other non-standard parts available - Consult factory



NOTE 1:
Orders for sensors welded to feedthroughs cannot be entered without signed off dimensional drawing. Once special length or manufactured order is confirmed, it is not cancelable. INFICON will provide a sensor length specification form

NOTE 2:
Feedthrough configuration varies depending on options selected (type of feedthrough, and connection). Example: CDS-A1F47 and -B1F47 use a 2-piece hybrid feedthrough design due to dimensional limits of a standard CF40.

NOTE 3:
Sensor lengths are measured from center of the crystal to the vacuum side (sealing surface) of the feedthrough (see drawing).

NOTE 6:
For sensors ordered without a weld connection (option "8"), tubes are made to a length of ~30" for standard and ~26" for right angle sensors.

Cool Drawer Single Sensor (continued)

Specifications

CDS series Cool Drawer Single Sensor Specifications

Finish	Stainless steel, gold plated Cool Drawer
Cooling water	0.2 GPM using 1/8" O.D. tube (Do not allow to freeze)
Electrical connection	(1) standard female BNC on atmosphere side
Crystal	Industry standard 0.550" diameter
Air Supply	Shuttered sensors require 55 to 60 psi regulated.
1 inch bolt and compression fitting terminations:	
Materials	304 stainless steel, Teflon®, ceramic, beryllium nickel, VITON®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture
CF 40 welded terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2 ¾" ConFlat type flanges with 1.375" I.D. min.

Spare Parts List

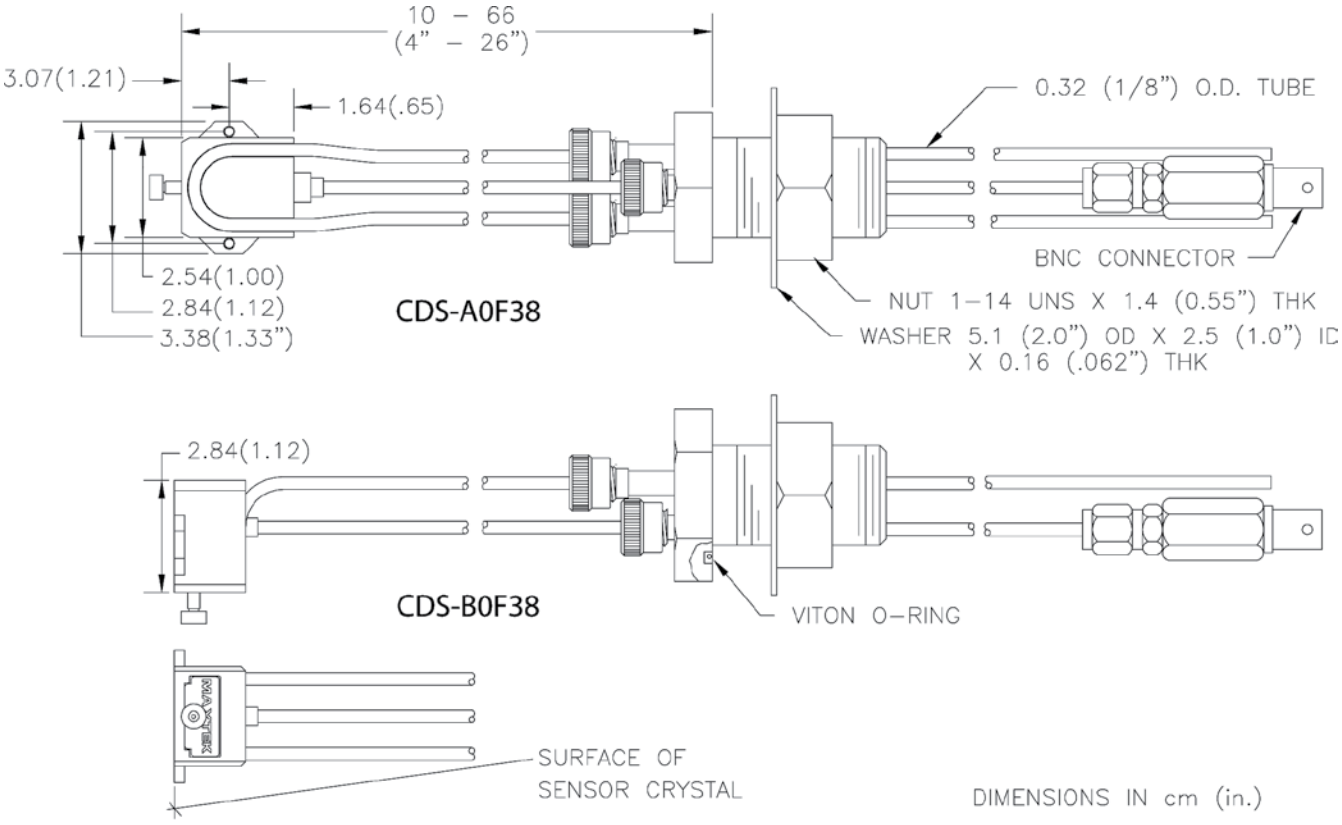
P/N	Description
123417	Shutter Bracket
123418	Bellows Cover
123419	Shutter
147207	Bellows & Cover Assembly
147402	Link
147403	Actuator
147406	Bellows Support
147407	Bellows Cover
147408	Threaded Shaft
147411	Spacer
147424	Bellows Tube

P/N	Description
084-205	#4-40 x 3/16 Philips Screw
800128	#4 Lockwasher
800371	Shoulder Screw
800372	Washer
800416	6-32 x 3/16 in. Set Screw
803313	Spring
123223-1	Conduit Brazed Assembly - Long Pin
123223-2	Conduit Brazed Assembly - Short Pin
147206-2	Bellows with 35 inch tube
803102	O-Ring for 5 port adjustable feedthrough
803261	Washer for 5 port adjustable feedthrough

Cool Drawer Single Sensor (continued)

Dimensions

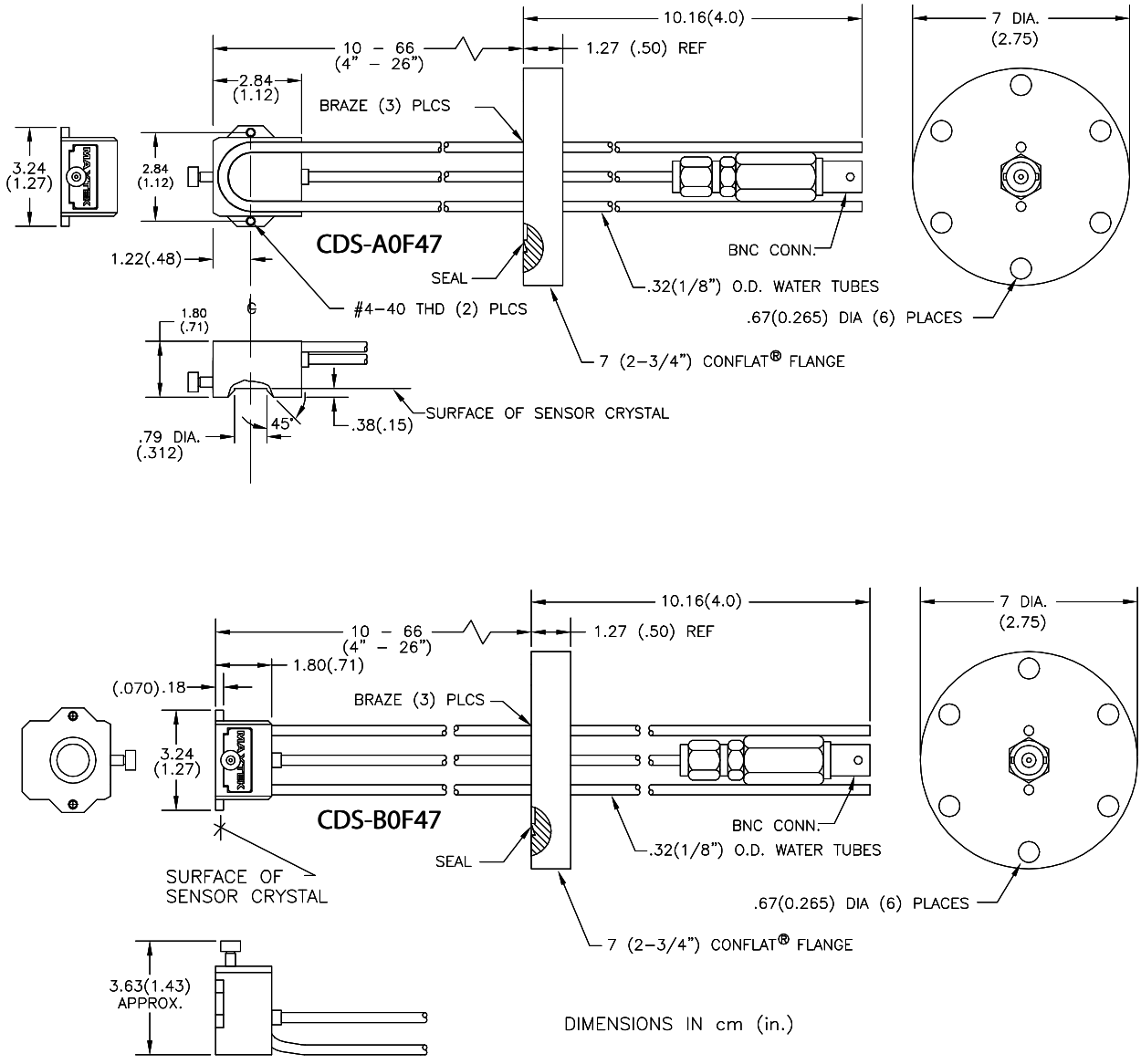
CDS-A0F38 and CDS-B0F38
Cool Drawer Single Sensor / Feedthrough Combinations



Cool Drawer Single Sensor (continued)

Dimensions

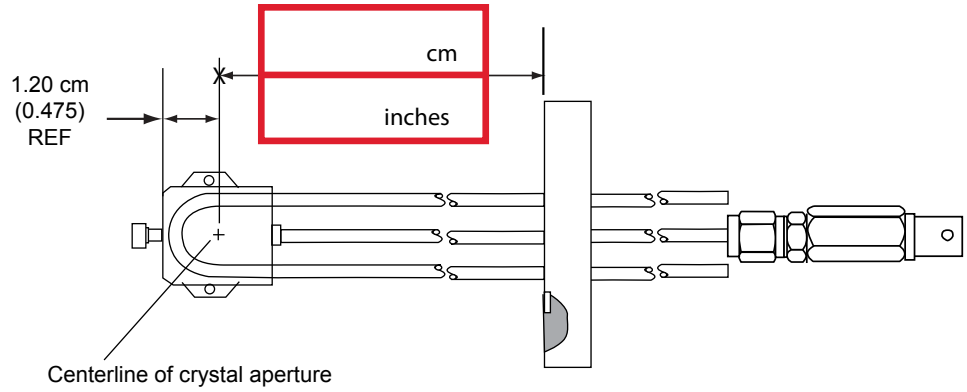
CDS-A0F47 and CDS-B0F47
Cool Drawer Single Sensor Feedthrough Combinations



Cool Drawer Single Sensor (continued)

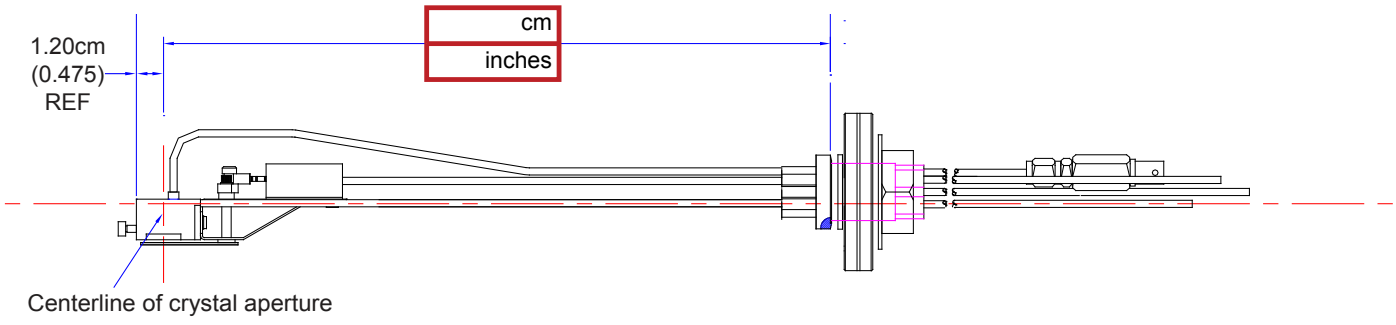
Dimensions

Sensor Length Specification for CDS-A0F47 Sensor / Feedthrough Combinations



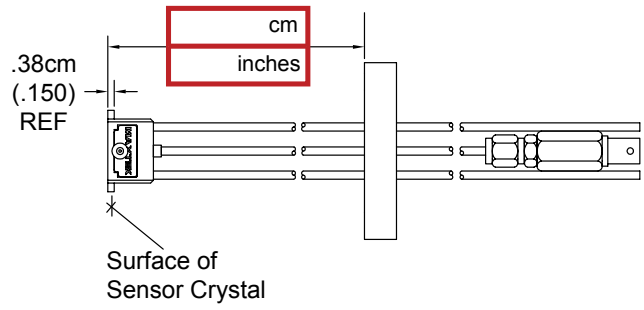
Dimensions

Sensor Length Specification for CDS-A1F47 Sensor / Feedthrough Combinations



Dimensions

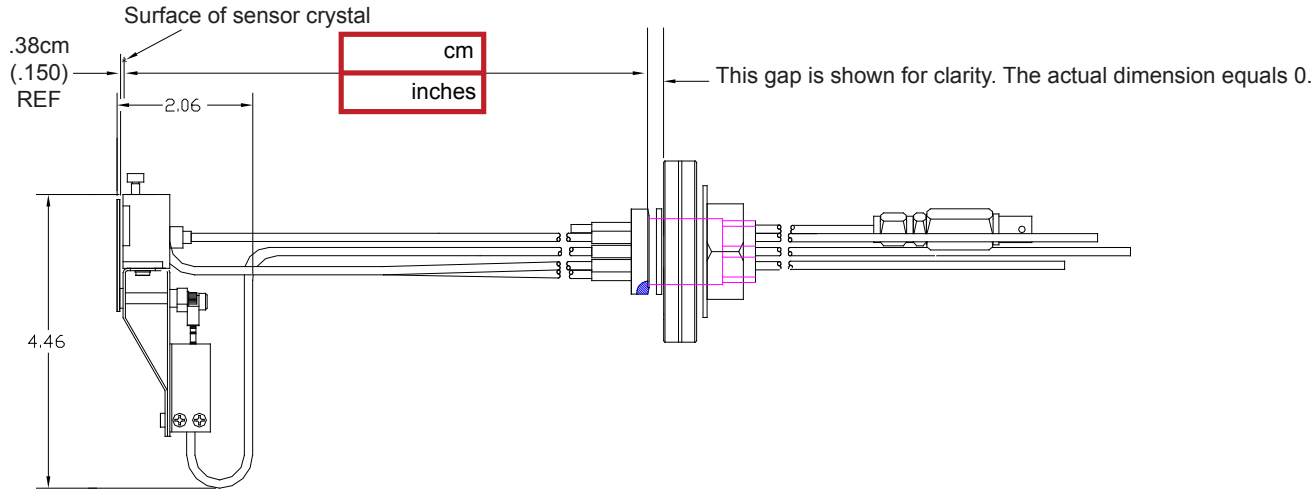
Sensor Length Specification for CDS-B0F47 Sensor / Feedthrough Combinations



Cool Drawer Single Sensor (continued)

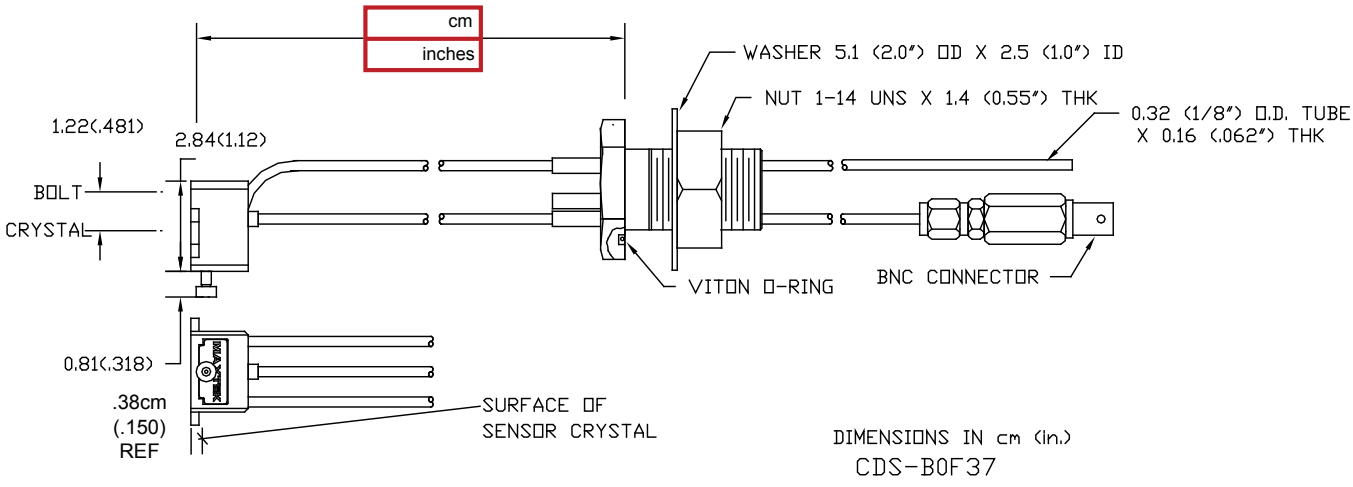
Dimensions

Sensor Length Specification for CDS-B1F47 Sensor / Feedthrough Combinations



Dimensions

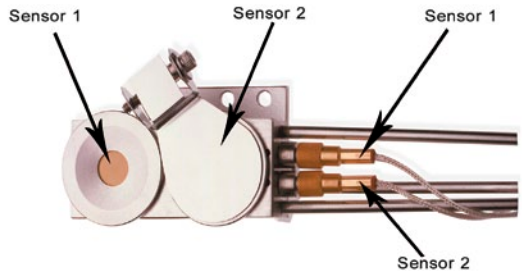
Sensor Length Specification for CDS-B0F37 Sensor / Feedthrough Combinations



Front Load Dual Sensor

INFICON Front Load Dual crystal sensors offer proven reliability and durability and have the best thermal stability of any sensor head on the market. The dual sensor provides a backup crystal and is essential for critical processes where it is desirable to have a second crystal in the vacuum chamber.

The front load design allows for easy insertion of the crystal holder in applications lacking sufficient room for side insertion. Assembled mechanically rather than soldered, parts can be replaced conveniently in the field, if necessary. Sensors can be ordered individually or in a sensor / feedthrough combination that can be either welded or assembled with compression fittings.



SENSOR CONFIGURATIONS

The Front Load Dual Sensor is available in a standard mount configuration where the water tubes are parallel to the crystal face. A pneumatically driven crystal shutter comes standard to protect the back up crystal, while the primary crystal monitors the deposition rate. The shutter is designed to flip down allowing easy crystal replacement.

The exposed crystal electrode is fully grounded to effectively eliminate problems due to RF interference.

FEEDTHROUGHS

INFICON offers two feedthroughs, a 1 inch bolt feedthrough or a 2¾ inch (CF40) ConFlat® flange feedthrough. KF40 feedthroughs are available on request.

FEEDTHROUGH CONNECTION

Front Load Dual Sensors can be ordered in combination with a feedthrough. The sensor / feedthrough connection can be either made with compression fittings or welded when in combination with a 1 inch bolt. If a weld connection is desired, a sensor length specification form, provided by INFICON, must be completed prior to ordering. Compression fittings allow for easy adjustability without the need for brazing or welding. The feedthrough can be moved along the length of the tubes allowing the length inside the vacuum systems to be adjusted over a range of 20.3 cm to 71.1 cm (8"- 28") for "E" length sensors and 20.3 cm to 121.9 cm (8" to 48") for "G" length sensors. Once the desired length is determined, the compression fittings allow for a finger tight tube seal.

Advantages

- Dual crystals
- Crystal shutter
- Front load crystal holder
- Easy installation
- Available with:
  - 2.54 cm (1 inch) bolt feedthrough
  - CF40 feedthrough
- Adjustable length if ordered with compression fittings
- No brazing required if ordered with compression fittings or welded to feedthrough
- Sensor / Feedthrough combinations available welded to customer specified lengths.

Front Load Dual Sensor (continued)

Ordering Information

Front Load Dual Sensor (with in-vacuum cables)

D L – [ ] [ ] [ ] [ ]

Type of sensor
(Includes in-vacuum Cables, Crystal Snatcher and User Manual. Crystals sold separately)

Dual Sensor (water lines parallel to crystal face) with shutter	A

Length of Sensor - SEE NOTES 1 and 3

Standard length - 203mm (8") to 711 mm (28") Includes two 781 mm (30.75") In-vacuum cables. **See Note 6**	E
Extended length - Greater than 711 mm (28"); maximum 1219 mm (48") Includes 1524 mm (60") In-vacuum cable. **See Note 6**	G

Feedthrough Connection

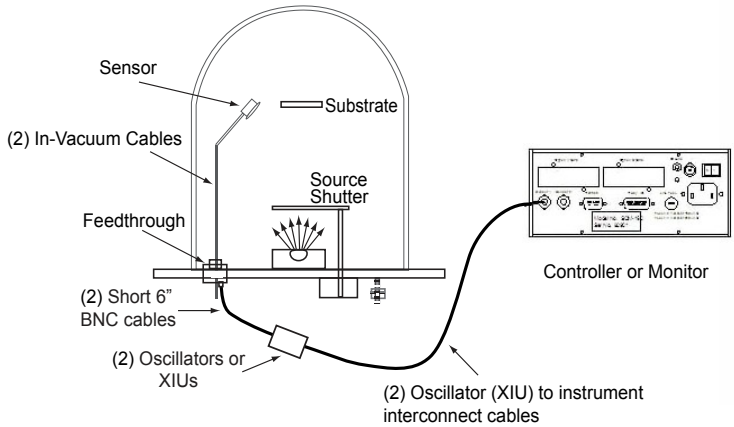
0	Sensor not connected to Feedthrough
7	Sensor Welded to Feedthrough
8	Variable length with Ultra-Torr® compression fittings. (Allows the sensor length to be variable by using Ultra-Torr compression fittings)

Feedthrough

0	None
3	2.54 cm (1") bolt
4	CF40

The following combinations are not available (See Notes 4 and 5):
DL-AE47, DL-AG47

Custom parts, special bends and other non-standard parts available - Consult factory



NOTE: 779-220-G1, crystal two switch option allows operation with only one oscillator (XIU).

NOTE 1:
Orders for sensors welded to feedthroughs cannot be entered without signed off dimensional drawing. Once special length or manufactured order is confirmed, it is not cancelable. INFICON will provide a sensor length specification form.

NOTE 2:
Feedthrough configuration varies depending on options selected (type of feedthrough, and connection). Example: SL-A0E37 uses feedthrough p/n 002-042 while SL-A1E37 uses feedthrough p/n 750-030-G1.

NOTE 3:
Sensor lengths are measured from center of the crystal closest to the end of the sensor to the vacuum side (sealing surface) of the feedthrough (see drawing).

NOTE 4:
Front Load Dual sensors ordered with 1" bolt style feedthrough require a special feedthrough (contact factory for availability).

NOTE 5:
Front Load Dual sensors ordered with a CF40 feedthrough cannot be welded due to dimensional limits of the CF40.

NOTE 6:
For sensors ordered without a weld connection (option "0" or "8"), tubes are made to a length of ~30" (762mm) for "E" length and ~48" (1219mm) for "G" length sensors.

Operation with 60" (152.4 cm) in-vacuum cables may require a special oscillator

Front Load Dual Sensor (continued)

Specifications

DL-A _ 0 0 series Front Load Dual Sensor Specifications

Maximum bakeout temp with no water	130°C
Maximum operating isothermal environment temperature with minimum water flow	400°C
Size (maximum envelope without shutter)	1.54" x 3.23" x 1.95" (39.12 mm x 82.04 mm x 49.54 mm)
Water tube and coax length, "E" sensor	Standard 30" (762 mm)
Crystal exchange	Front-loading, self-contained package for ease of exchange Shutter flips up to ease access to the holders
Mounting	Two #4-40 tapped holes on the back of the sensor body
Installation Requirements	
Feedthrough	Qty. (1) 2¾" (69.85 mm) ConFlat® with 2 Microdot®, 2 pass water and air or Qty. (1) 1 in. (25.4 mm) bolt with 2 Microdot, 2 pass water and air
Other	1) Valve assembly for air—IPN 750-420-G1 2) Two oscillators or one oscillator and 779-220-G1 CrystalTwo Switch designed to interface with the deposition controller. 3) For automatic operation, the deposition process controller must be designed for the implementation of this feature.
Utilities	1) Minimum water flow 150-200 cc/min, 30°C max (Do not allow to freeze.) 2) Air, 80 PSIG (5.5 bar) [552 kPa] very low volume, maximum 110 PSIG (7.6 bar) [760 kPa]
Water quality	Coolant should not contain chlorides as stress corrosion cracking may occur. Extremely dirty water may result in loss of cooling capacity.
Materials	
Body and holder	304 Type stainless steel
Springs	Au plated Be-Cu
Water tubes	S-304, 0.125" (3.175 mm) OD x 0.015" (0.381 mm) Wall thickness seamless stainless steel tubing
Connector (Microdot)	Stainless steel, Teflon® and glass insulated
Insulators	>99% Al_2O_3
Wire	Teflon insulated copper
Other mechanical parts	304 or 18-8 stainless steel
Braze	Vacuum process high temperature Ni-Cr alloy
Crystal	0.550" (13.97 mm) diameter

Front Load Dual Sensor (continued)

Specifications

Feedthrough Specifications

NOTE: Sensor / Feedthrough combination specifications are determined by lowest component specification

1 inch bolt and compression fitting terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel, VITON®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture
CF 40 welded terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2 ¾" ConFlat type flanges with 1.375" I.D. min.

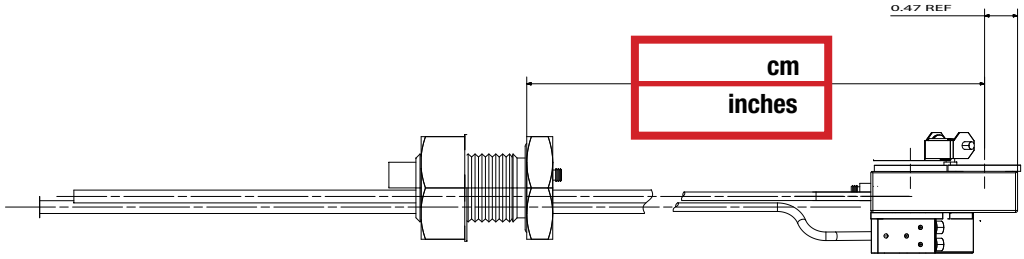
Spare Parts List

P/N	Description
007-007	Retainer Spring (for Crystal Holder)
007-023	Ceramic Retainer
007-044	In-Vacuum Cable, 30.75 in./ 78.1cm
080-018	Set Screw (for Female Coax)
082-044	Teflon Screw (for Leaf Spring)
750-115-P4	Coupling (for Bellows Assembly)
750-169-P2	Bellows Assembly (Coupling not included)
750-171-P1	Finger Spring Contact
750-172-G1	Crystal Holder (includes Retainer Spring)
750-174-P2	Female Coax
750-175-P1	Insulator (underneath Leaf Spring)
750-188-P2	Leaf Spring
750-210-G1	Shutter Module (Bellows Assembly, Shaft Assembly, and Shutter Assembly)
750-215-G1	Shaft Assembly (part of Shutter Module)
750-216-G1	Shutter Assembly (part of Shutter Module)
321-039-G13	In-Vacuum cable 60" (152.4 cm)

Front Load Dual Sensor (continued)

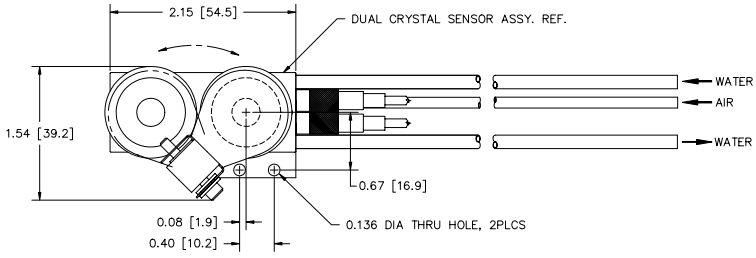
Dimensions

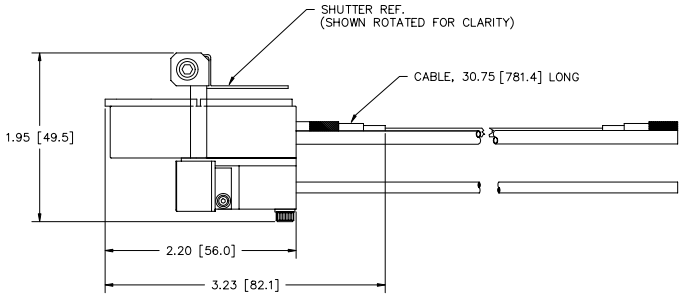
Sensor Length Specification for DL-AE00 or DL-AG00 Sensor / Feedthrough Combinations

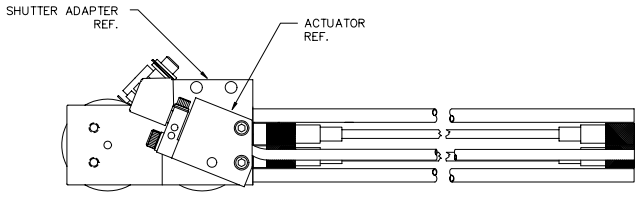


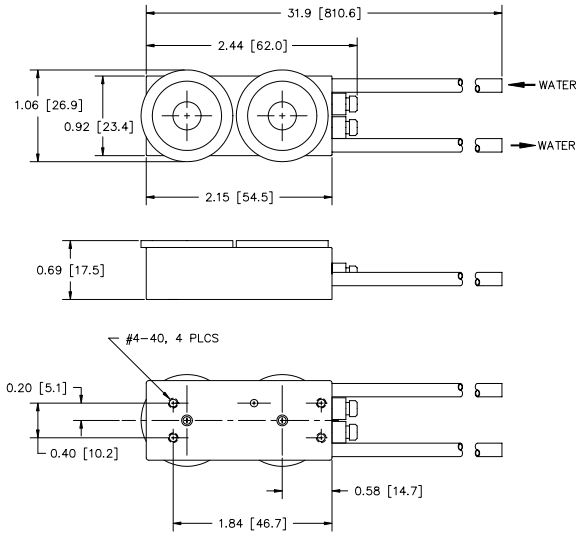
Dimensions

DL-AE00 or DL-AG00
Front Load Dual Sensor (sensor only)





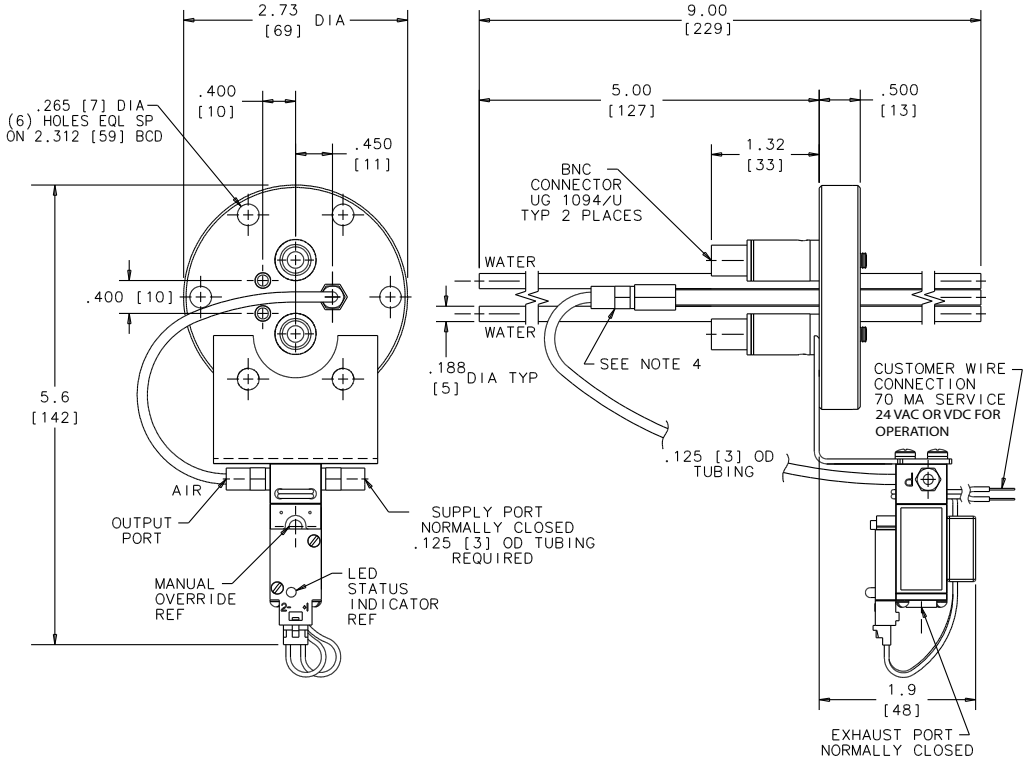




Front Load Dual Sensor (continued)

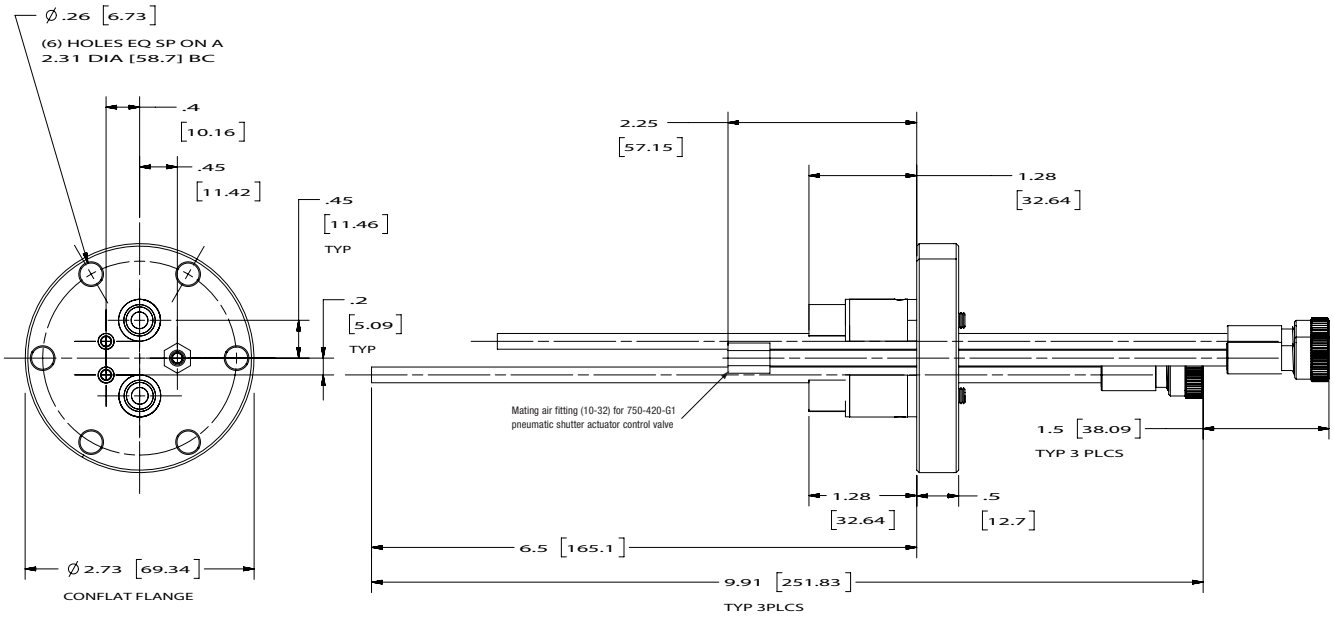
Dimensions

Feedthrough used for DL-A _ 4 0 Sensor / Feedthrough Combination



Dimensions

Feedthrough Used For DL-A _ 4 8 Sensor / Feedthrough Combination



Cool Drawer Dual Sensor

The Cool Drawer™ Dual Sensor is designed for use in critical processes where it is desirable to have a second crystal in the vacuum chamber. Water cooled, cast stainless steel sensor body, two Cool Drawer crystal holders and a pneumatically actuated shutter provide for a rugged sensor head with the extra reliability of a backup crystal. A cleaner, more reliable vacuum system installation is possible as there are no coaxial cables inside the chamber.

SENSOR CONFIGURATIONS

Two sensor configurations are offered: The standard version and the right angle version. The standard version is designed for installation from the side or bottom of the chamber and the cooling tubes and the crystal face are parallel. The right angle version is designed for installation through the top of the vacuum system and the water cooling tubes are perpendicular to the crystal face. In either configuration, sensor head length can range from 10 to 66 cm (4" to 26").

FEEDTHROUGHS

INFICON offers two choices for feedthrough types: a 1" bolt feedthrough or a CF40 feedthrough.

FEEDTHROUGH CONNECTIONS

Cool Drawer dual sensors must be ordered in combination with a feedthrough. The sensor / feedthrough connection can be either welded or made with compression fittings.

Compression fittings allow for easy adjustability without the need for brazing or welding. Sensor head length is adjustable from 10 to 66 cm (4" to 26"). When selected with the welded CF40, the sensor is designed for high temperature processes where reliability is critical. Constructed of stainless steel and ceramic materials, it is suitable for applications requiring high temperature bake out (see specifications).

The Cool Drawer Dual Sensor with the CF40 flange is pre-installed in a special two piece 7 cm (2¾") ConFlat® feedthrough. This allows the sensor head to be rotated independently of the flange and circumvents the dimensional limitations of the CF40 flange. Sensor / Feedthrough length can be specified between 10 and 66 cm (4" to 26").

Advantages

- Dual crystals
- Cool Drawer crystal holder
- No internal cables
- Crystal shutter
- Available with:
  - CF40 feedthrough
  - 2.54 cm (1inch) bolt feedthrough
- Bakeable if ordered with welded CF40 flange
- Adjustable length if ordered with compression fittings
- Sensor / Feedthrough combinations available welded to customer specified lengths

Cool Drawer Dual Sensor (continued)

Ordering Information

Cool Drawer Dual Sensor (with conductor tubes)

C	D	D	–				

Type of sensor (includes User Manual. Crystals sold separately)

Standard Cool Drawer Dual Sensor (water lines parallel to crystal face) with shutter	A
Right Angle Cool Drawer Dual Sensor (water lines perpendicular to crystal face) with shutter	B

Length of Sensor - SEE NOTE 3

Length - (minimum 102 mm (4") to 660 mm (26")) **SEE NOTE 6**	F

Feedthrough Connection

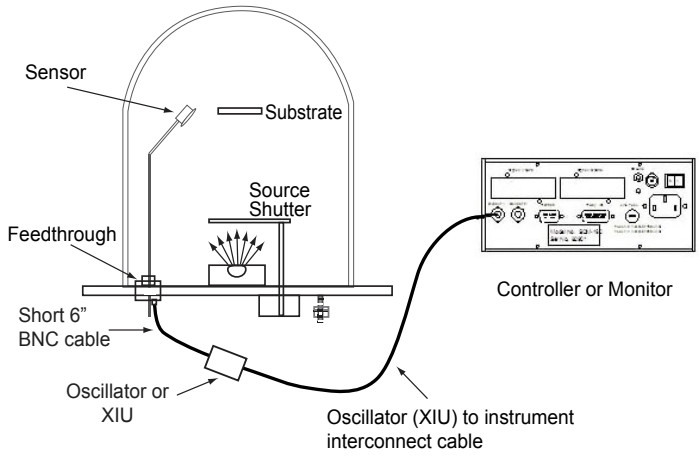
7 8	Sensor Welded to Feedthrough - Variable length with Ultra-Torr® compression fittings. (Allows the sensor length to be variable by using Ultra-Torr compression fittings) Not available with CF40 feedthrough.

Feedthrough - SEE NOTE 2

3	1" bolt
4	CF40 (two piece)

The following combinations are not available: CDD-AF48, CDD-BF48

Custom parts, special bends and other non-standard parts available - Consult factory



NOTE 1:
Orders for sensors welded to feedthroughs cannot be entered without signed off dimensional drawing. Once special length or manufactured order is confirmed, it is not cancelable. INFICON will provide a sensor length specification form.

NOTE 2:
Feedthrough configuration varies depending on options selected (type of feedthrough, and connection). Example: CDD-AF47 and -BF47 use a 2-piece hybrid feedthrough design due to dimensional limits of a standard CF40.

NOTE 3:
Sensor lengths are measured from center of the crystal closest to the end of the sensor to the vacuum side (sealing surface) of the feedthrough (see drawing).

NOTE 6:
For sensors ordered without a weld connection (option "8"), tubes are made to a length of approximately 762mm (30") for standard sensors and approximately 660mm (26") for right angle sensors.

Cool Drawer Dual Sensor (continued)

Specifications

CDD Series Cool Drawer Dual Sensor Specifications

Finish	Stainless steel, gold plated Cool Drawer™
Cooling water	0.2 GPM using 1/8" O.D. tube (Do not allow to freeze)
Crystal	Industry standard 0.550" diameter
Air supply	55 to 60 PSI regulated
Electrical connection	(2) standard female BNCs on atmosphere side
1 inch bolt and compression fitting sealed terminations	
Materials	304 stainless steel, Teflon®, ceramic, beryllium nickel, VITON®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture
CF40 welded terminations	
Materials	304 stainless steel, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2 3/4" ConFlat® type flanges

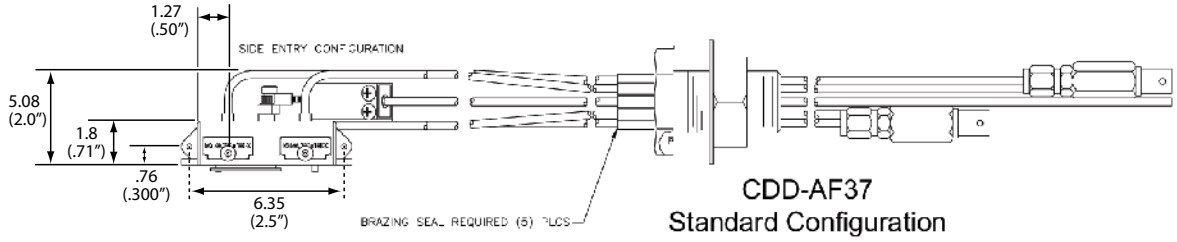
Spare Parts List

P/N	Description
147401	Shutter
147402	Link
147403	Actuator
147406	Bellows Support
147407	Bellows Cover
147408	Threaded Shaft
147411	Spacer
147424	Bellows Tube
084-205	#4-40 x 3/16 Philips Screw
800128	#4 Lockwasher
800371	Shoulder Screw
800372	Washer
800416	6-32 x 3/16 in. Set Screw
803313	Spring
123223-2	Conduit Brazed Assembly - Short Pin
803102	O-Ring for 5 port adjustable feedthrough
803261	Washer for 5 port adjustable feedthrough

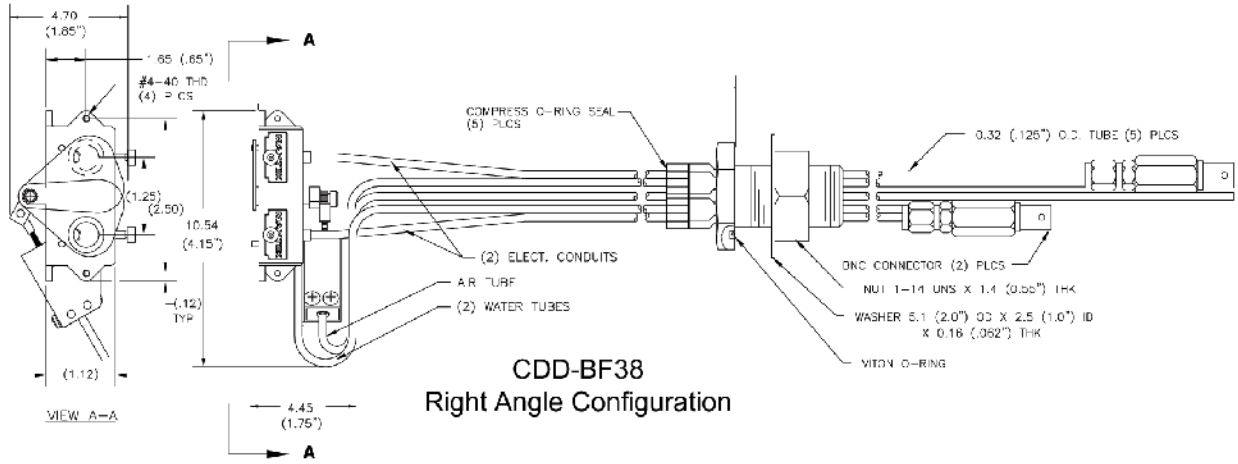
Cool Drawer Dual Sensor (continued)

Dimensions

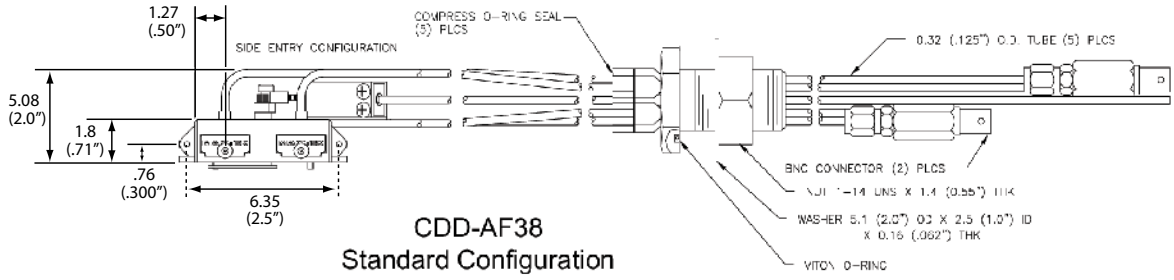
CDD-AF37, CDD-AF38 and CDD-BF38
Cool Drawer Dual Sensor / Feedthrough Combinations



CDD-AF37
Standard Configuration



CDD-BF38
Right Angle Configuration

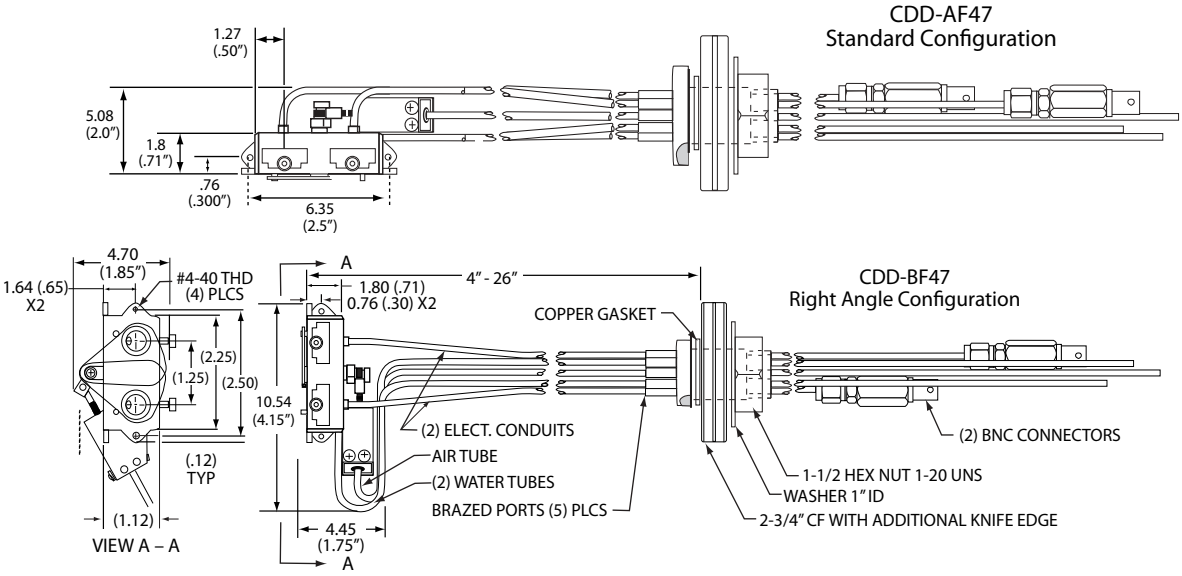


CDD-AF38
Standard Configuration

Cool Drawer Dual Sensor (continued)

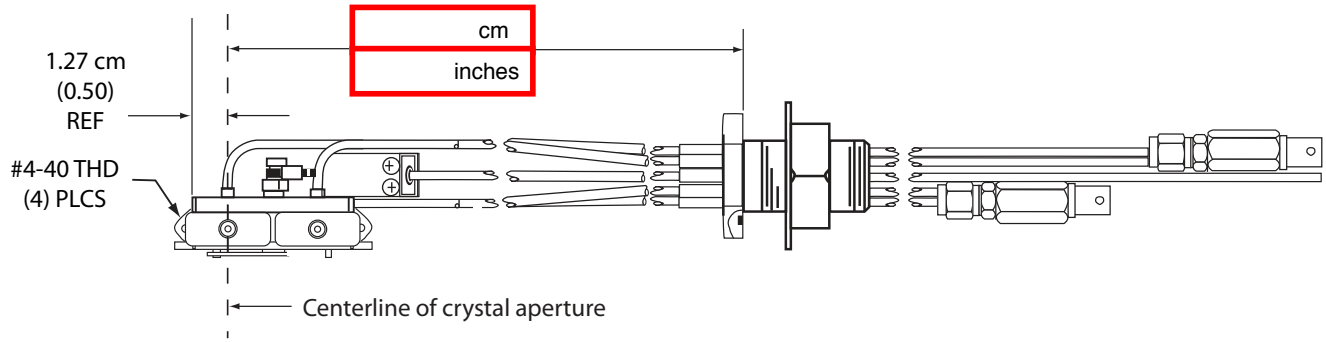
Dimensions

CDD-AF47 and CDD-BF47
Cool Drawer Dual Sensor / Feedthrough Combinations



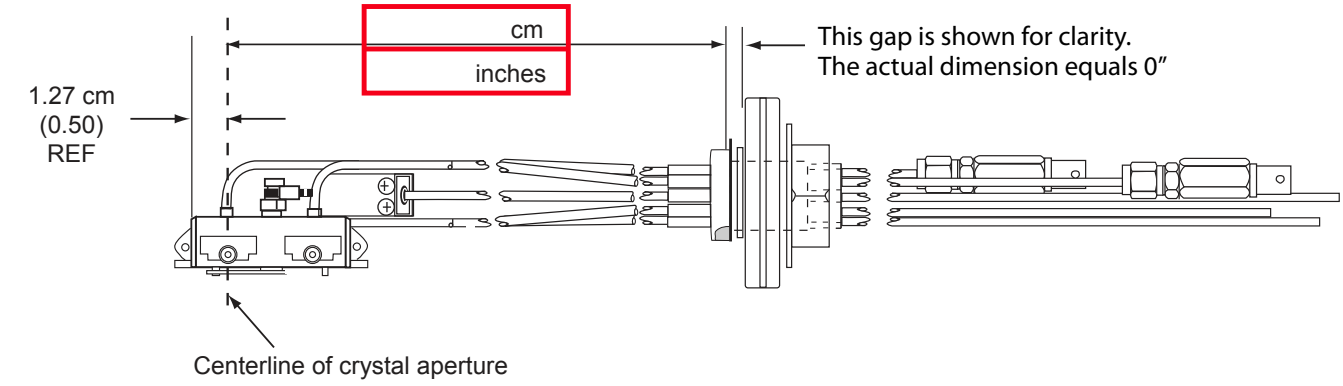
Dimensions

Sensor Length Specification for CDD-AF37 Sensor / Feedthrough Combination



Dimensions

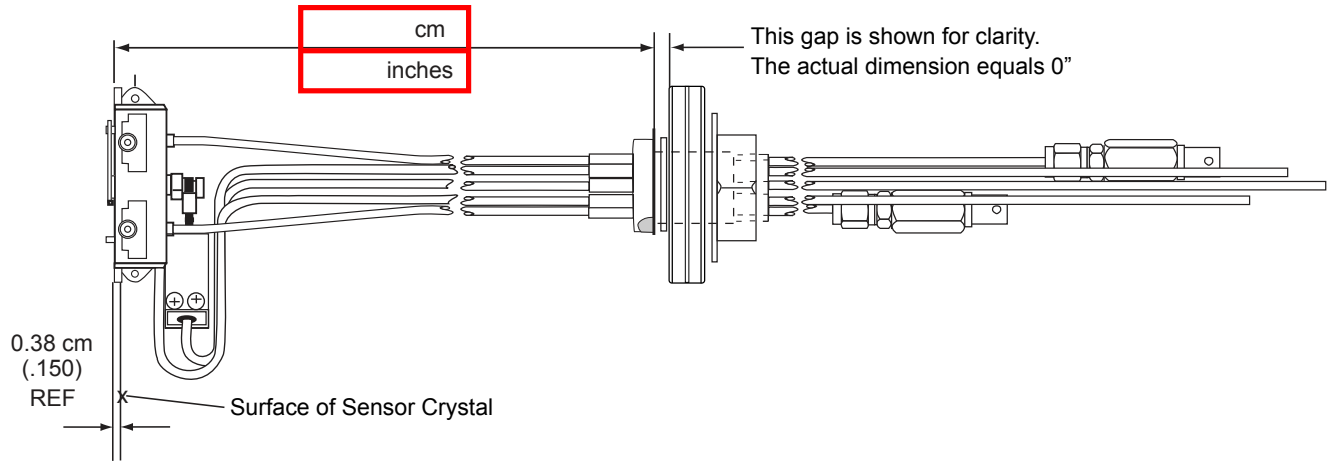
Sensor Length Specification for CDD-AF47 Sensor / Feedthrough Combination



Cool Drawer Dual Sensor (continued)

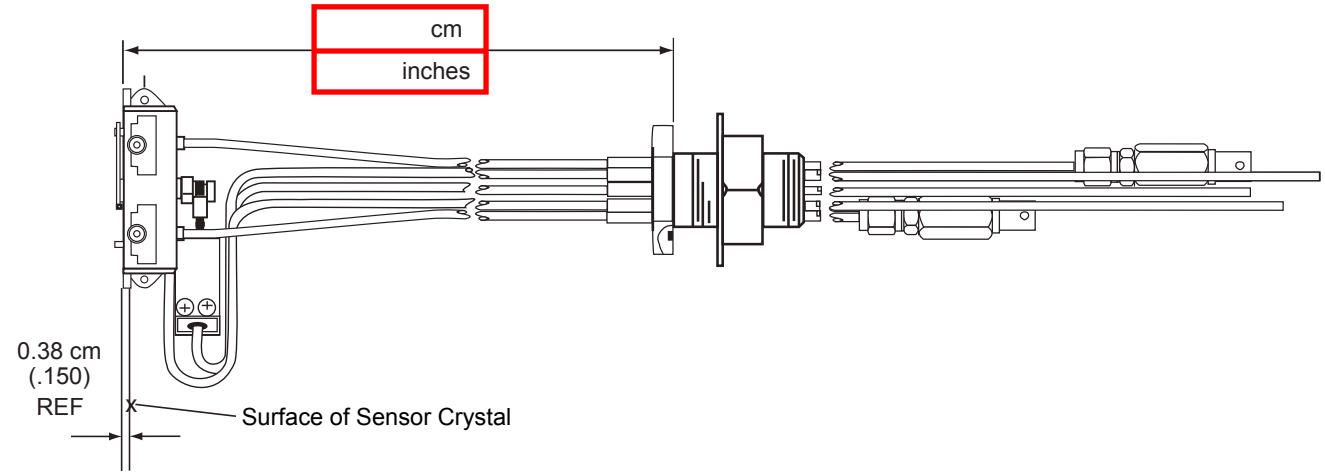
Dimensions

Sensor Length Specification for CDD-BF47 Sensor / Feedthrough Combination



Dimensions

Sensor Length Specification for CDD-BF37 Sensor / Feedthrough Combination



Front Load Bakeable Sensor

INFICON Front Load Bakeable Crystal Sensors offer proven reliability and durability and have the best thermal stability of any sensor head on the market. Made from 304 Stainless Steel, Molybdenum, Inconel, Nickel, and Alumina materials, the Bakeable sensor is designed to withstand continuous bake-out temperatures up to 450ºC (for bakeout only, water flow required for actual deposition monitoring). The front load design allows for easy insertion of the crystal holder in applications lacking sufficient room for side insertion.

SENSOR CONFIGURATIONS

The Front Load Bakeable Sensor is available in a standard configuration where the water tubes are parallel to the crystal face. Optionally, sensors can be ordered with a pneumatically driven crystal shutter to protect the crystal during source warm up, when not used during deposition of an alternate material, or to extend crystal life when used with RateWatcher™.

The exposed crystal electrode is fully grounded to effectively eliminate problems due to RF interference.

FEEDTHROUGH AND FEEDTHROUGH CONNECTION

All Bakeable sensors come welded to a 2¾" (CF40) ConFlat® flange feedthrough. Sensor length must be specified and a sensor length specification form, provided by INFICON, must be completed prior to ordering.

Advantages

- High temperature braze & welded construction
- Bakeout temperatures to 450ºC
- Crystal shutter (option)
- Front load crystal holder
- Easy installation
- CF 40 feedthrough
- No brazing or welding to feedthrough required
- Sensor / Feedthrough combination welded to customer specified lengths

Front Load Bakeable Sensor (continued)

Ordering Information

Front Load Bakeable Sensor

B	K	–			

Type of sensor (includes Crystal Snatcher and User Manual. Crystals sold separately)

Top load (water lines parallel to crystal face)	A

Shutter Assembly

None	0
Standard shutter	1

Length of Sensor - SEE NOTE 3

F	Shuttered Sensors Specify from 17.0 cm - 101.6 cm (6.687" - 40") Non-Shuttered Sensors Specify from 10.2 cm - 101.6 cm (4" - 40"

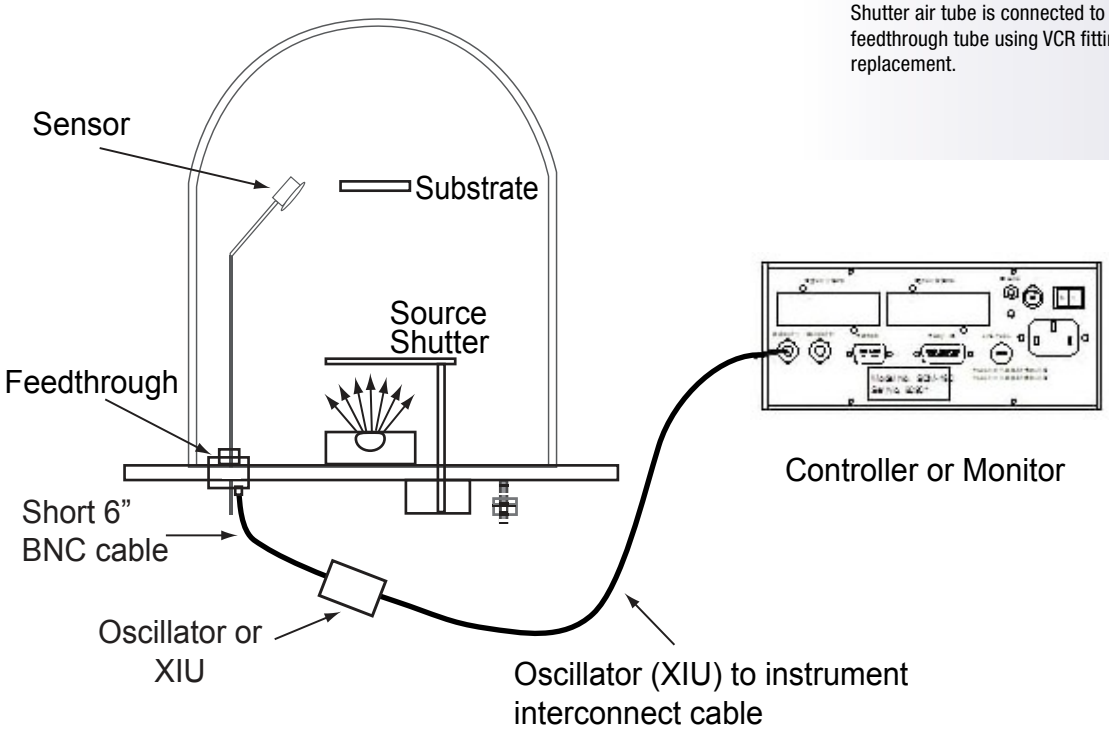
**Sensor lengths over 76.2 cm (30") are subject to an additional charge, as well as 2-4 weeks additional lead time.

Custom parts, special bends and other non-standard parts available - Consult factory

NOTE 1:
Orders cannot be entered without signed off dimensional drawing. Once order is confirmed, it is not cancelable. Sensor lengths are measured from the center of the crystal to the vacuum side (sealing surface) of the feedthrough (see drawing). INFICON will provide a sensor length specification form.

NOTE 2:
All Bakeable Sensors are welded to a CF40 flange.

NOTE 3:
Shutter air tube is connected to the feedthrough tube using VCR fittings for field replacement.



Front Load Bakeable Sensor (continued)

Specifications

BK-A0F Series Bakeable Sensor Without Shutter

Maximum temperature	450°C continuous (for bake only; water flow recommended for actual deposition monitoring)
Sensor head size (maximum envelope)	1.35" x 1.38" x 0.94" high (34 mm x 35 mm x 24 mm high)
Crystal exchange	Front loading, self-contained package for ease of exchange. Cam-type locking handle allows easy removal and good thermal contact.
Mounting	Four #4-40 tapped holes on the back of the body
Feedthrough	2¾" ConFlat, integral with sensor head Water and coax tubes are semi-rigid, but easily formed. (2.0 in. (50.8 mm)) minimum bend radius)
Utilities	Minimum water flow 150-200 cc/min, 30°C max. (Do not allow to freeze.) (Customer should provide means of easily disconnecting the ¼" water tubes during bakeout.)
Materials	
Body and holder	304 type stainless steel
Springs	Molybdenum & Inconel X-750
Water and coax lines	0.125" (3 mm) O.D. water x 0.015" (0.4 mm) wall thickness seamless 304 stainless steel; 0.188" (5 mm) O.D. coax
Other mechanical parts	18-8 or 304 stainless
Insulators	>99% Al_2O_3 in vacuum; other high density ceramics used elsewhere
Wire	1) Ni (in vacuum) 2) Ni plated Cu (elsewhere)
Braze	Vacuum process high temperature Ni-Cr alloy
Crystal	0.550" (13.97 mm) diameter

Specifications

BK-A1F Series Bakeable Sensor With Shutter

Maximum temperature	450°C continuous (for bake only; water flow recommended for actual deposition monitoring)
Sensor head size (maximum envelope)	1.35" x 1.38" x 1.21" high (34 mm x 35 mm x 31 mm high)
Crystal exchange	Front loading, self-contained package for ease of exchange. Cam-type locking handle allows easy removal and good thermal contact. Pneumatically operated shutter flips up for easy crystal exchange.
Mounting	a) Standard—four #4-40 tapped holes on the back of the body b) Optional—right angle bracket; IPN 007-108
Feedthrough	2¾" ConFlat®, integral with sensor head Water, air and coax tubes are semi-rigid, but easily formed (2.0" (50.8 mm) minimum bend radius)
Utilities	1) Minimum water flow 150-200 cc/min, 30°C max. (Do not allow to freeze.) (Customer should provide means of easily disconnecting the ¼" water tubes during bakeout.) 2) Filtered, oil-free air, regulated at 80 PSIG (5.5 bar) [552 kPa], to 100 PSIG (6.895 bar) [689.5 kPa] max 3) Pneumatic actuator shutter control valve, 750-420-G1, 24 VAC or VDC, or equivalent valve required

Front Load Bakeable Sensor (continued)

Specifications

BK-A1F Series Bakeable Sensor With Shutter (continued)

Materials	
Body and holder	304 type stainless steel
Springs	Molybdenum & Inconel X-750
Water, air and coax lines	0.125" (3 mm) O.D. water & air x 0.015" (0.4 mm) wall thickness seamless 304 stainless steel; 0.188" (5 mm) O.D. coax
Other mechanical parts	18-8 or 304 stainless
Insulators	>99% Al_2O_3 in vacuum; other high density ceramics used elsewhere
Wire	1) Ni (in vacuum) 2) Ni plated Cu (elsewhere)
Braze	Vacuum process high temperature Ni-Cr alloy
Crystal	0.550" (13.97 mm) diameter

Spare Parts List

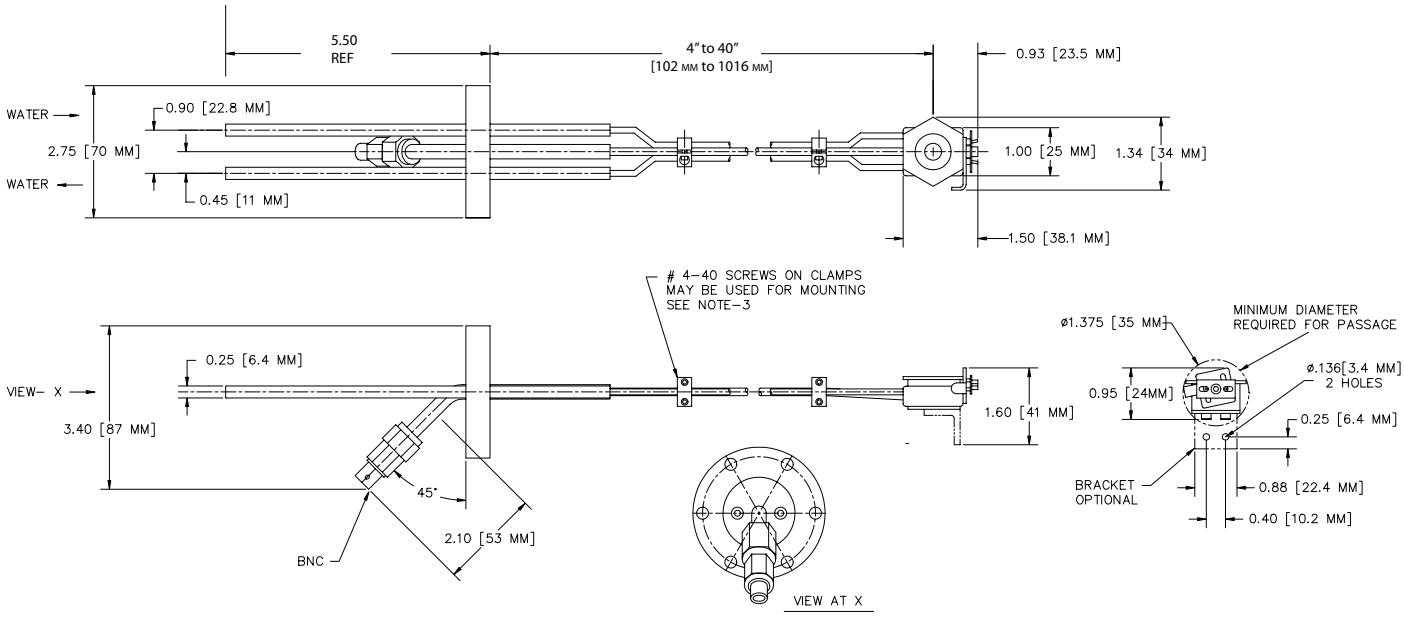
P/N	Description
007-064	Ceramic Retainer
007-094	Clamping Spring
007-095	Handle
007-098	Female Connector (includes ferrules and Nut)
007-099	Bakeable Head Contact
007-100	Insulator for BNC
007-103	Insulator for Bakeable Head Contact
007-104	BNC Body
007-155	Braze Assy - 12 in./ 30.5 cm
007-156	Braze Assy - 20 in./ 50.8 cm
007-157	Braze Assy - 30 in./ 76.2 cm
007-147	#4-40 x 3/8 Screw
007-007	Retainer Spring (part of Crystal Holder)
007-228	#4-40 x 5/8 Screw
059-0084	VCR Gasket
070-0201	#4 Split Lockwasher
007-267-P2	Spreader Bar

P/N	Description
007-268-P1	Shoulder Washer
007-269-P1	Shoulder Washer
084-069-P1	#4-40 x 3/16 Screw
750-018-P3	Split Clamp
750-018-P5	Split Clamp
750-022-G5	Bellows Assembly - 12 in./ 30.5 cm
750-022-G6	Bellows Assembly - 20 in./ 50.8 cm
750-022-G7	Bellows Assembly - 30 in./ 76.2 cm
750-028-G5	Braze Assy w/ Air Line - 12 in./ 30.5 cm
750-028-G6	Braze Assy w/ Air Line - 20 in./ 50.8 cm
750-028-G7	Braze Assy w/ Air Line - 30 in./ 76.2 cm
750-115-P4	Coupling
750-118-P4	Actuator Support
750-120-G3	Shaft Assembly
750-216-G1	Shutter Assembly
750-218-G1	Crystal Holder

Front Load Bakeable Sensor (continued)

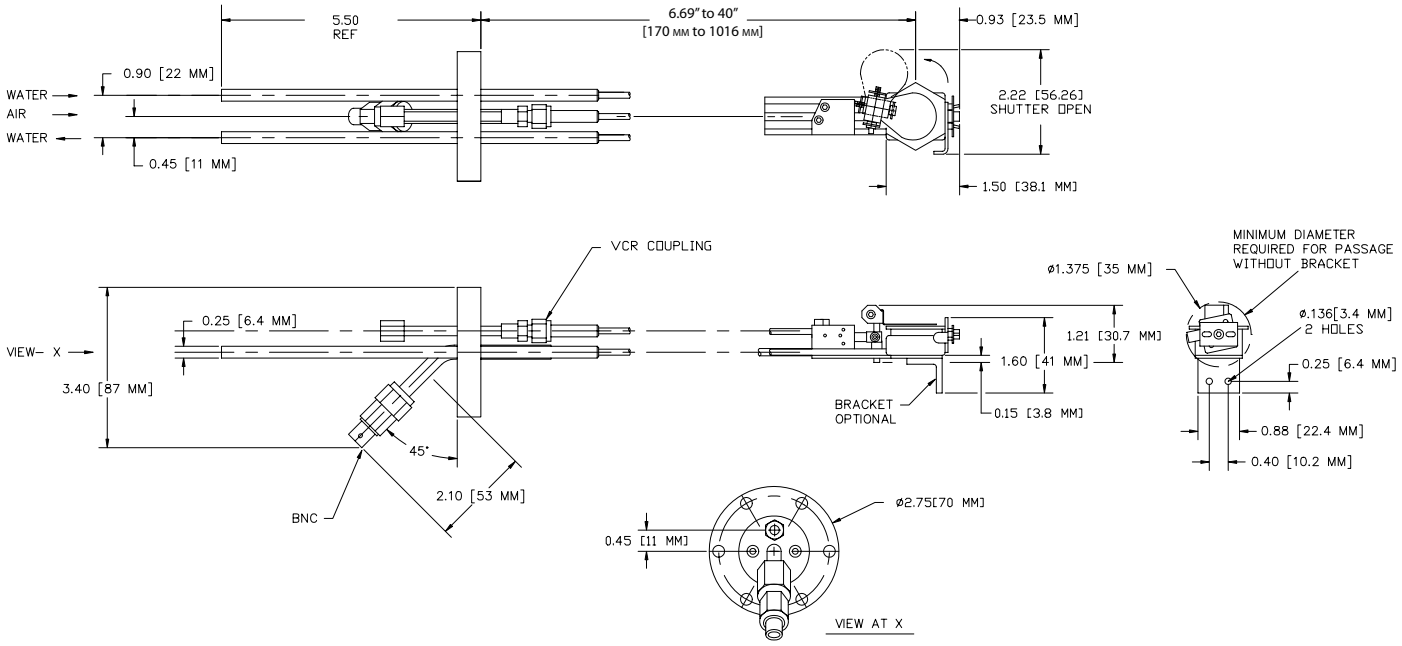
Dimensions

BK-A0F Sensor / Feedthrough Combination



Dimensions

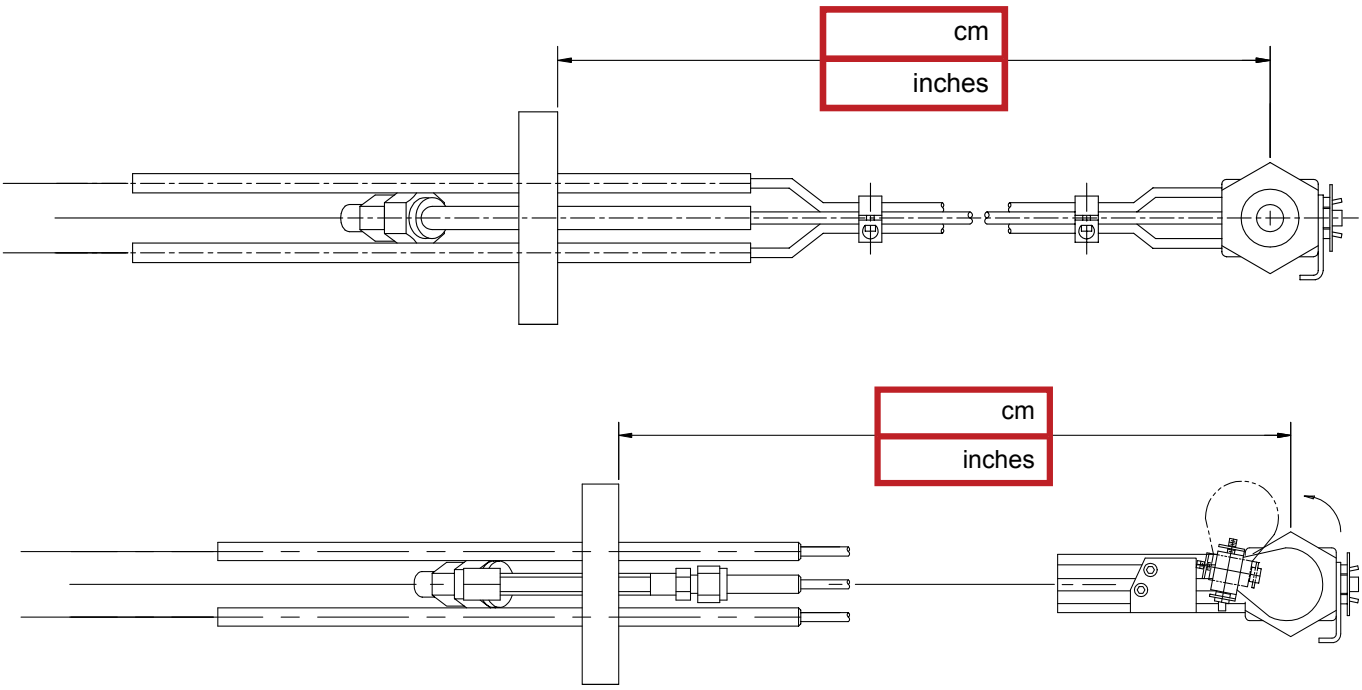
BK-A1F Sensor / Feedthrough Combination



Front Load Bakeable Sensor (continued)

Dimensions

Sensor Length Specification for BK-A0F and BK-A1F Sensor / Feedthrough Combinations



Sputtering Sensor

The INFICON Sputtering Sensor is specifically designed for use in any sputtering process. The sensor body and cooling tubes are gold plated beryllium copper for maximum cooling efficiency in the sputtering environment. A magnet built into the sensor head reduces excessive heating by energetic free electrons in sputtering systems by deflecting them with the external magnetic field. The rear loading crystal holder design allows easy crystal replacement without having to remove the sensor head from the system.

Advantages

- Gold plated beryllium copper sensor body and cooling tubes for maximum cooling efficiency
- Magnet to deflect free electrons away from the monitor crystal
- Easy installation with bendable water tubes allowing flexibility in sensor placement
- Rear load crystal insertion for easy crystal replacement

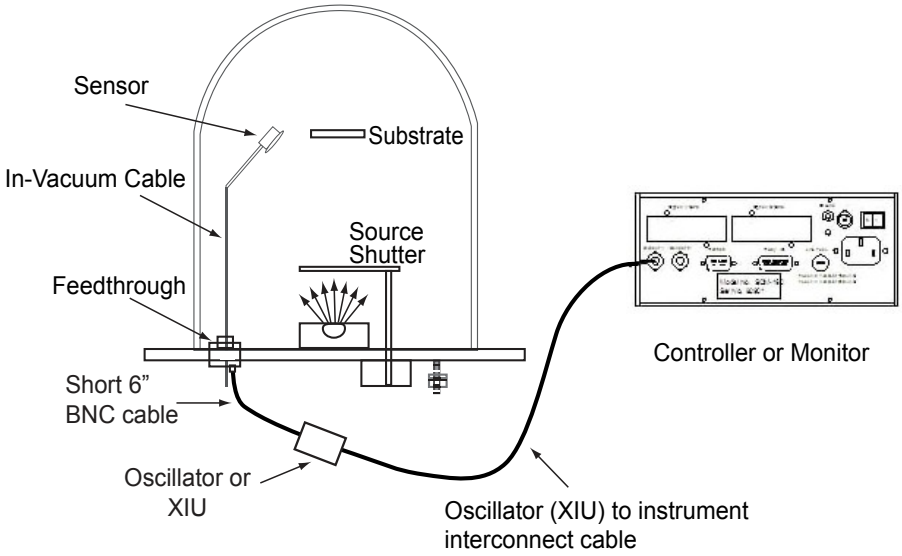
Ordering Information

Sputtering Sensor

Sputtering Sensor	750-618-G1
Sputtering Sensor Shutter Module	750-005-G1

NOTES:

Includes 78 cm (30.75") in-vac cable, crystal snatcher and manual (other length cables ordered separately) (crystals sold sepearately)



Sputtering Sensor (continued)

Specifications

750-618-G1 Sputtering Sensor

Maximum bakeout temp with no water	105°C
Size (maximum envelope)	1.36" OD x 0.69" high (3.45 cm x 1.75 cm)
Water, air and coax length	Standard 30" (76.2 cm)
Crystal exchange	Rear-loading
Mounting	Customer supplied
Installation Requirements	
Feedthrough	2 pass water with coax connector 2¾" ConFlat® Flange - IPN 002-043 1" Bolt - IPN 002-42
Other	1) Customer to provide vacuum-tight braze joints or connectors for the water tubes. 2) XIU or Oscillator designed to interface with the specific deposition controller.
Water flow rate	Minimum water flow 750 cc/min, 30°C max (Do not allow to freeze) Coolant should not contain chlorides as stress corrosion cracking may occur. If the water tube passes through a cryoshroud, drain the tubes if the water flow is stopped for any reason.
Materials	
Body and holder	Au plated Be-Cu
Springs, electrical contacts	Au plated Be-Cu
Water tubes	Au plated Be-Cu, 0.125" (0.32 cm) O.D.
Connector	304 Stainless steel
Insulators	99% Al2O3
Wire	Teflon® insulated copper
Solder	Cadmium free silver and indium alloys
Crystal	0.550" (1.4 cm) Diameter
Magnet	ALNICO 5 Alloy
Optional Shutter Assembly 750-005-G1 Specifications:	
Temperature	130°C
Materials	300 series stainless steel
Pressure	90-95 PSIG (6.2-6.55 bar) [620-655 kPa] operation 110 PSIG (7.6 bar) [760 kPa] maximum
Shutter	Pneumatically operated, requires pneumatic shutter actuator control valve, 750-420-G1
Braze	Vacuum process high temperature Ni-Cr Alloy

Sputtering Sensor (continued)

Specifications

Feedthrough Specifications

NOTE: Sensor / Feedthrough combination specifications are determined by lowest component specification

1 inch bolt and compression fitting terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel, VITON®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture

CF 40 welded terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2 ¾" ConFlat type flanges with 1.375" I.D. min.

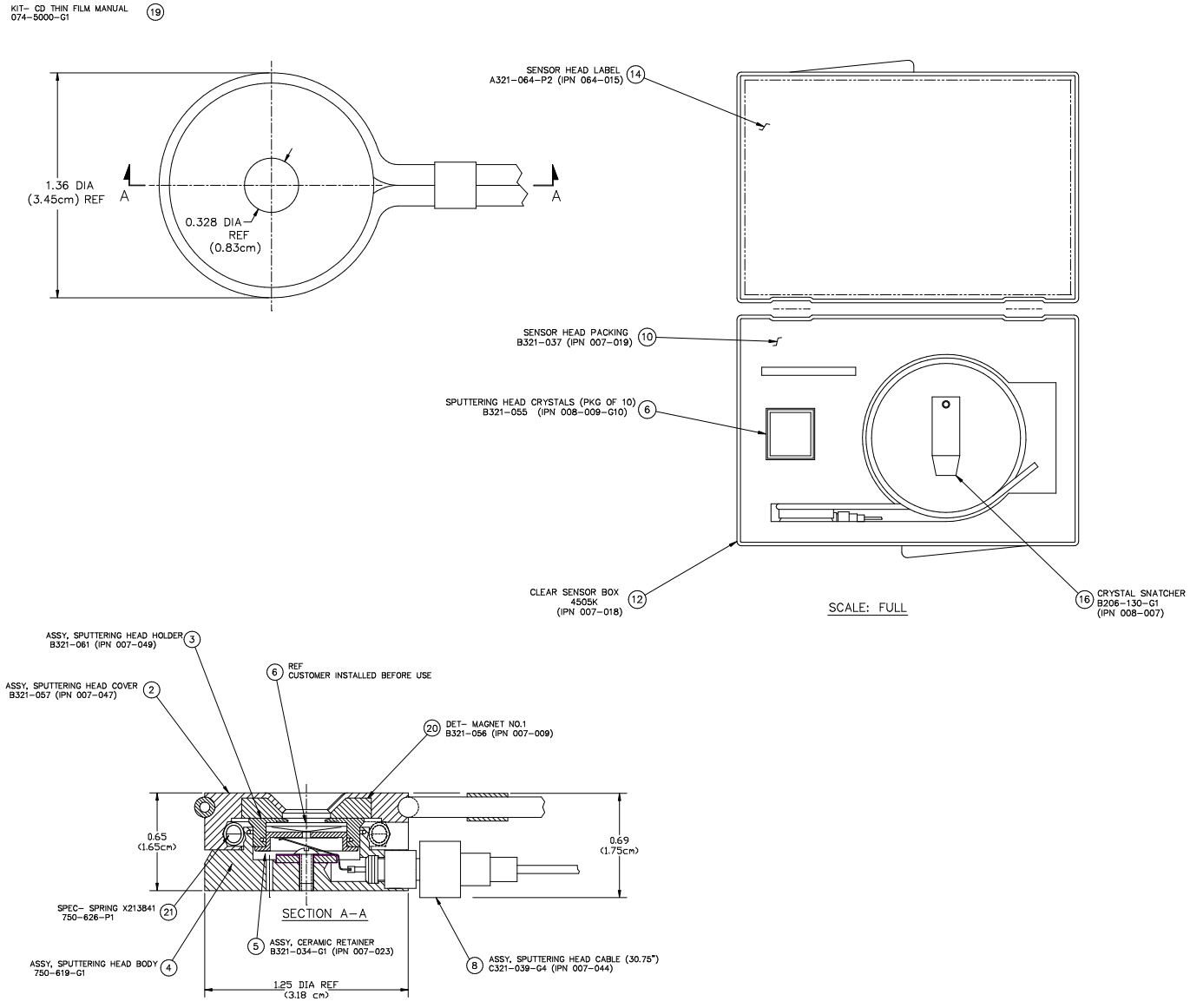
Spare Parts List

P/N	Description
007-023	Ceramic Retainer
007-049	Crystal Holder
007-007	Retainer Spring for Crystal Holder
007-044	In-Vacuum Cable (30.75 in./ 78.1 cm)
007-047	Sputtering Head Cover with water lines
007-009	Magnet for Sputtering Head Cover
070-0440	Retaining Ring (installs onto shaft of Shutter Assembly)
070-0442	Retaining Ring (installs onto shaft of Shutter Assembly)
070-0441	Spacer (installs onto shaft of Shutter Assembly)
082-044	2-56 X .25 in. Teflon Screw for 750-619-G1 Sputtering Head Body
082-029-P1	2-56 X 1/8 in. Set Screw for 750-619-G1 Sputtering Head Body
750-005-G1	Pneumatic Shutter Assembly
750-009-P2	Pivot Cover (installs onto shaft of Shutter Assembly)
750-046-G2	Shutter Assembly for Pneumatic Shutter Assembly
750-048-P1	Retainer Spring for 007-048 and 750-619-G1 Sputtering Head Bodies
750-115-P4	Coupling (installs into Bellows Assembly)
750-169-P4	Bellows Assembly for Pneumatic Shutter Assembly
750-174-P2	Female Coax Connector for 750-619-G1 Sputtering Head Body
750-175-P1	Insulator for 750-619-G1 Sputtering Head Body
750-188-P2	Leaf Spring for 750-619-G1 Sputtering Head Body
750-619-G1	Sputtering Head Body with coax connector
750-626-P1	Spring for Sputtering Head Cover

Sputtering Sensor (continued)

Dimensions

750-618-G1 Sputtering Sensor

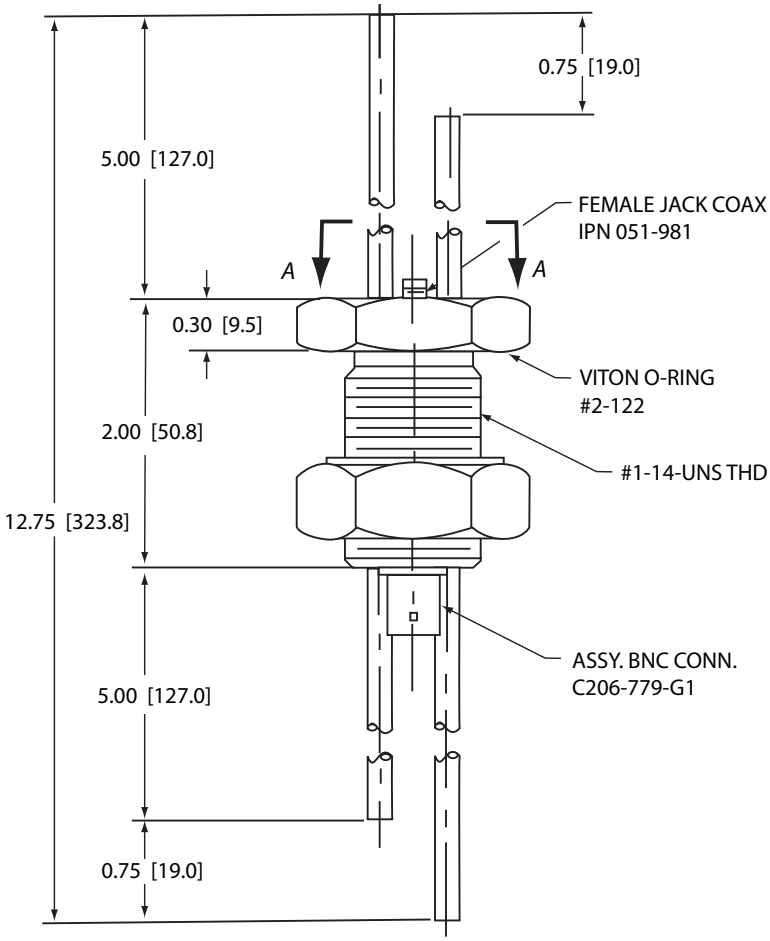


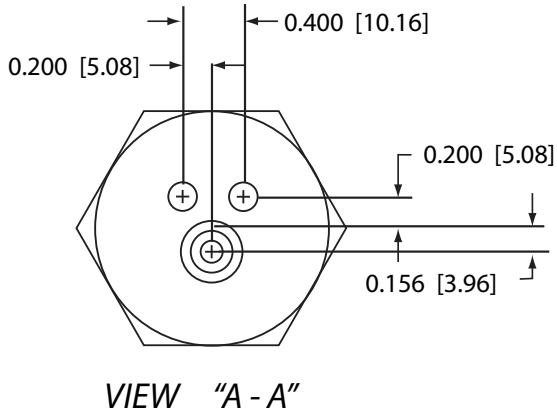
Sputtering Sensor (continued)

Dimensions

Sputtering Head can be used with the following Feedthroughs:

P/N 002-042

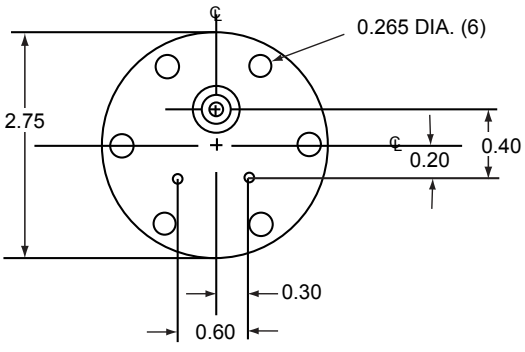


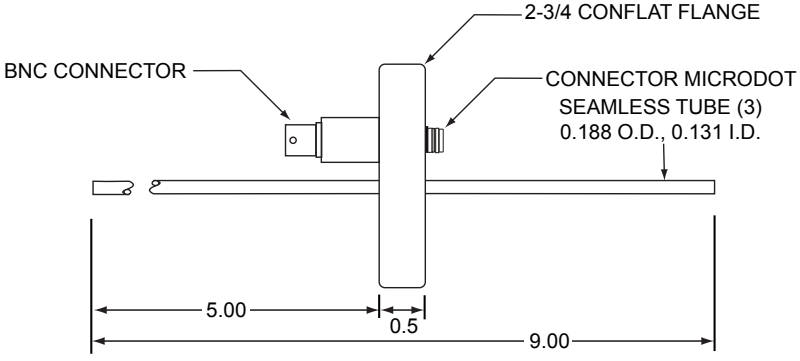


VIEW "A - A"

Dimensions

P/N 002-043

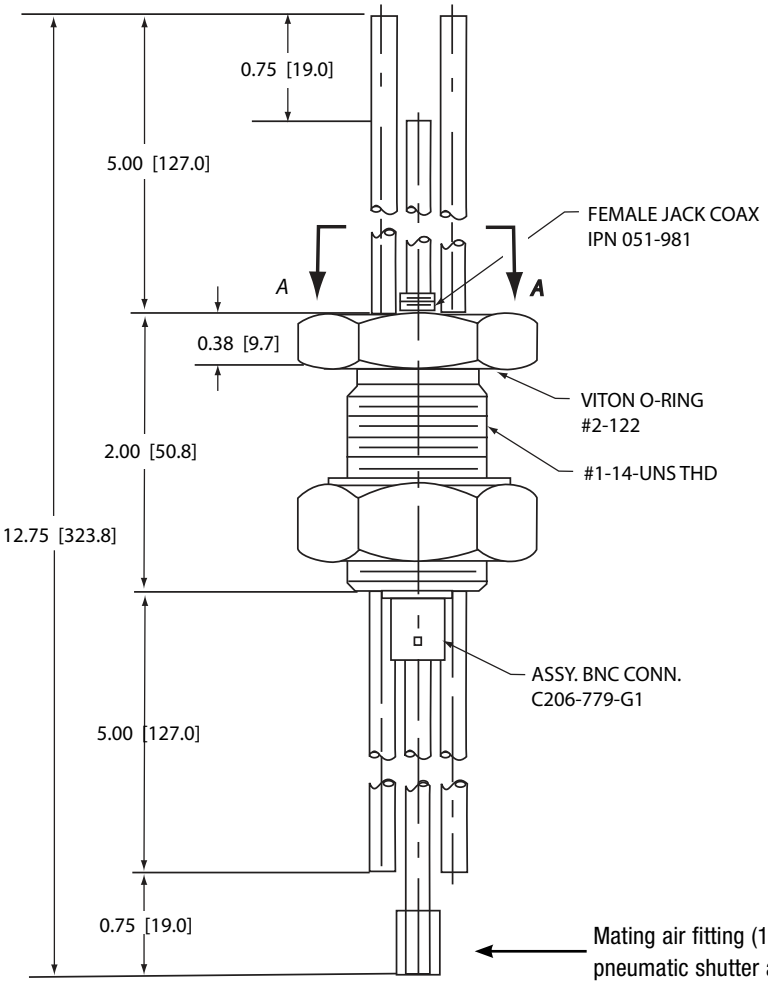


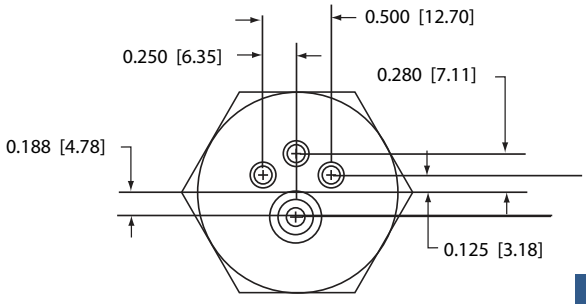


Sputtering Sensor (continued)

Dimensions

P/N 750-030-G1



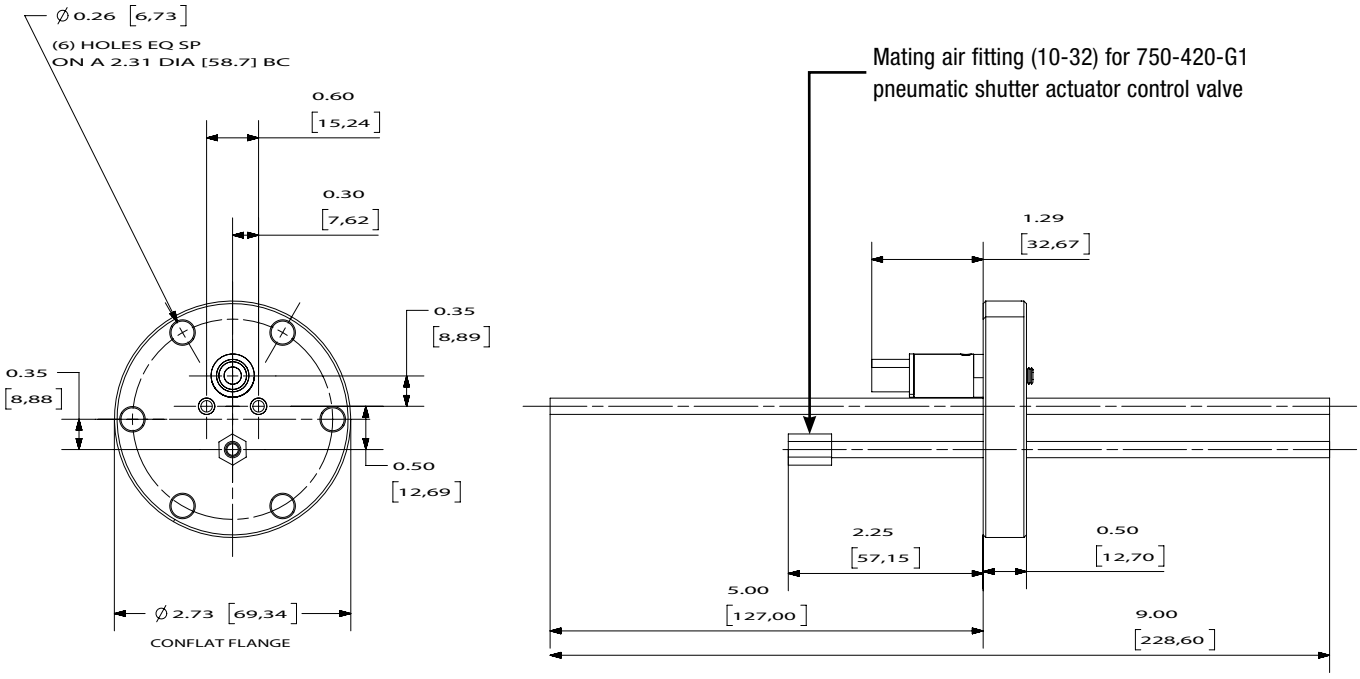


VIEW "A - A"

Sputtering Sensor (continued)

Dimensions

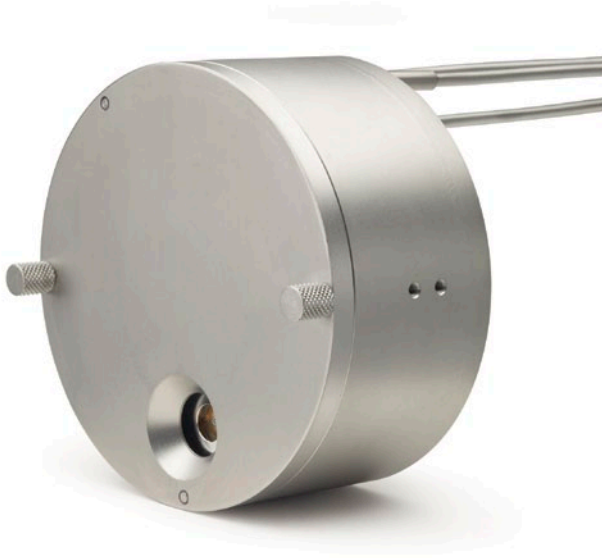
P/N 750-685-G1



Crystal 12 Sensor

The INFICON Crystal 12 sensor is critical for long processes demanding continuous rate control. Whether an OLED, MBE, Solar or other process having an extended period between chamber venting, the Crystal 12 sensor offers the security of 12 quartz monitor crystals in one sensor head. When used with Cygnus®, XTC/3M, XTC/3S, SQC310 or SQC310C, the Crystal 12 automatically rotates a new crystal into position whenever the current crystal fails or becomes unstable. Crystals are automatically replaced without interrupting your process for continuous deposition rate monitoring. To further minimize downtime, crystals can be preloaded into a second optional carousel, which can then be quickly and easily exchanged with the carousel containing the exhausted crystals, minimizing the time the system is open.

Crystal indexing is accomplished with a pneumatically driven mechanism. This pneumatically driven motor provides better thermal stability than competitive units using expensive in-vacuum, heat generating, electric motors. One-eighth inch water cooling tubes keep the sensor head thermally stable and allow flexibility in sensor placement.



Advantages

- Holds 12 crystals with robust, automatic switching to maximize process uptime
- Easy-to-remove carousel allows fast replacement of all 12 crystals
- Stable crystal temperature, because crystal switching is pneumatically-driven (competitive units use heat-generating motors)
- 1/8" tubes maintain thermal stability and allow flexibility in sensor placement
- Easy-to-remove front deposition shield protects the crystals and carousel from material accumulation, minimizing the need to remove entire sensor for maintenance
- Optional mounting-post kit can be user-modified to accommodate metric hardware
- Optional crystal shutter available

Crystal 12 Sensor (continued)

Ordering Information

Crystal 12 Sensor

X	L	1	2	–						

Type of sensor (includes User Manual. Crystals sold separately)

None	0
Base unit - Crystal 12 Sensor	1

In-vacuum Cable Assembly Length

None	0
30.75 inch (78cm) **See Note 3**	1
6 inch (15.2cm)	2
12 inch (30.5cm)	3
24 inch (61cm)	4
36 inch (91.4cm)	5
48 inch (121.9cm)	6
60 inch (152.4cm)	7
72 inch (182.9cm)	8

Crystal Carousel Assembly

One (included in base unit)	0
Spare Crystal Carousel assembly	1

Pneumatic Valve

0	No
1	Yes

Mounting Post with Hardware

0	None
1	Mounting Post Kit

Front Deposition Shield

0	One (included in base unit)
1	Spare Front Deposition Shield

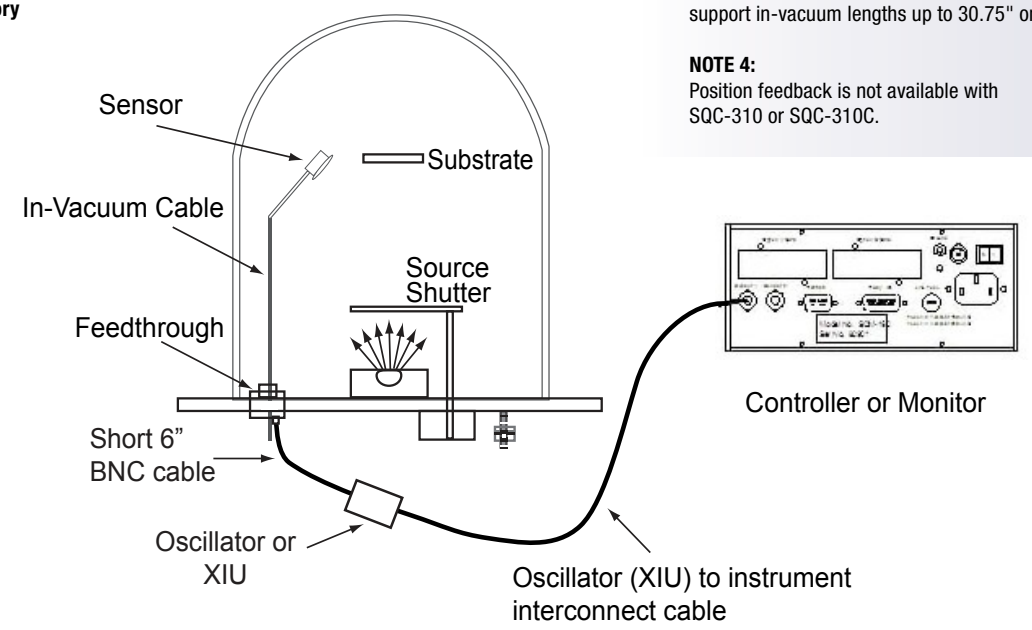
NOTE 1:
Auto Crystal Switch only with IC6, Cygnus, XTC/3M, XTC/3S, SQC310, and SQC310C

NOTE 2:
The Crystal 12 Sensor requires the 750-420-G1 pneumatic control valve

NOTE 3:
All lengths are supported with IC6, Cygnus, XTC/3M and XTC/3S. SQC310 and SQC310C support in-vacuum lengths up to 30.75" only.

NOTE 4:
Position feedback is not available with SQC-310 or SQC-310C.

Custom parts, special bends and other non-standard parts available - Consult factory



Crystal12 Sensor (continued)

Specifications

XL12 series Crystal 12 Sensor Specifications

Maximum bakeout temp with no water	130°C
Maximum operating isothermal environment temperature with minimum water flow	300°C
Size (maximum envelope)	4.0" (102 mm) dia. x 3.3" (84 mm) high 4.75" (121 mm) dia. x 3.46" (88 mm) with optional mounting posts installed
Water and air length	Standard 30" (762 mm)
Crystal exchange	Front-loading
Mounting	Six #4-40 tapped holes on the back of the sensor body, six #4-40 tapped holes on outside circumference. Three #6-32 tapped holes with optional mounting kit
Installation Requirements	
Feedthrough	Qty (1) 2¾" ConFlat® with two coaxial feedthroughs, two pass water, one air, IPN 002-080, or, Qty (1) 1" bolt with 1 coaxial feedthrough, two pass water, one air IPN 750-030-G1
Other	User to provide mounting structure adequate to support weight of Crystal12 and designed to facilitate removal and replacement with minimal change in exact position. An optional mounting post kit, IPN 750-670-G1, may be purchased for this purpose User to provide vacuum-tight braze joints or connectors for the water and air tubes Valve assembly for air, IPN 750-420-G1 (not provided), with a 0.022" restrictor orifice installed by the user. (Orifice included with Crystal12 accessory kit) XIU or Oscillator designed to interface with the Cygnus controller
Utilities	Minimum water flow 150-200 cc/min, 30°C max (Do not allow water to freeze) Coolant should not contain chlorides as stress corrosion cracking may occur Regulated air supply 80-90 PSIG (5.5 bar - 6.2 bar) [550 kPa - 620 kPa] 2 meter maximum length of 1/8" tubing between bellows assembly and the control valve
Materials	
Plate, Material Shield, Mechanical Parts, Body and Carousel	304 type stainless steel
Springs, Electrical Contacts	Au plated Be-Cu, Au Plated 302 stainless steel
Water and air tubes	S-304, 0.125" (3.2 mm) O.D. x .016" (0.4 mm) Wall Thickness x 30" Long (762 mm) seamless stainless steel tubing
Connector	Stainless steel
Insulators	Teflon, Peek®
Cable	Teflon insulated copper plated steel
Crystal	0.550" (13.97 mm) diameter

Crystal 12 Sensor (continued)

Specifications

Feedthrough Specifications

Note: Sensor / Feedthrough combination specifications are determined by lowest component specification.

1 inch bolt and compression fitting terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel, Viton®
Temperature	Operational environment to 300ºC with water cooling or 165ºC without
Mounting	1.015" ±0.010" diameter aperture
CF 40 welded terminations:	
Materials	304 stainless steel, Teflon, ceramic, beryllium nickel
Temperature	Operational environment to 450ºC with water cooling or 165ºC without
Mounting	Mates with 2¾" ConFlat type flanges with 1.375" I.D. min

Crystal12 Sensor (continued)

Spare Parts List

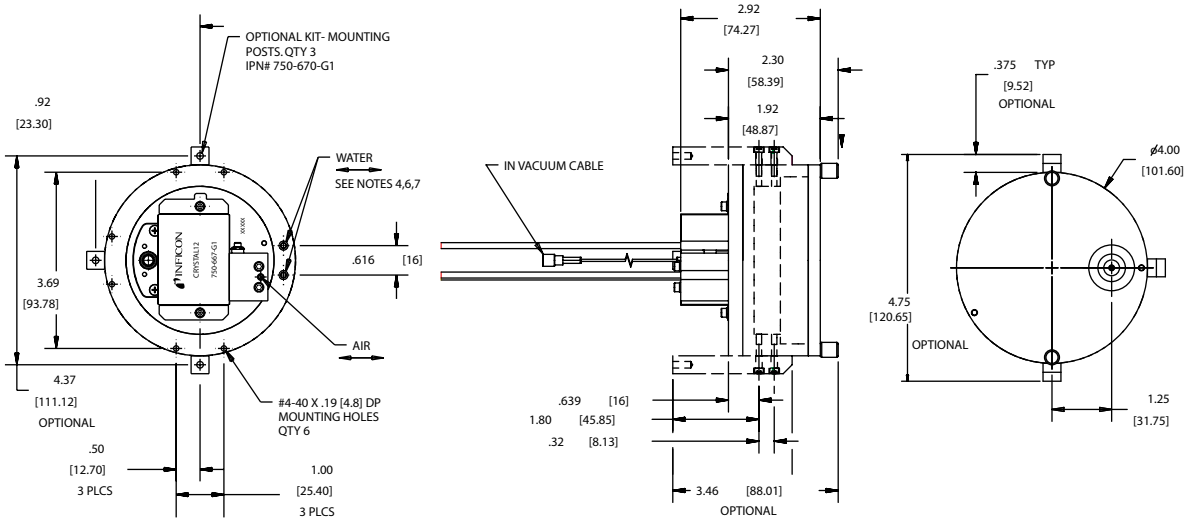
P/N	Description
750-276-P3	Actuator Cover
750-644-G1	Housing
750-658-G1	Deposition Shield
750-286-P2	Pneumatic Actuator
750-291-P1	Detent
750-294-P2	Stop Ratchet
750-293-P2	Ratchet
750-256-P2	Extension Spring
750-252-P2	Spring Post
750-649-G1	Electrical Connection
750-295-G1	Pawl & Actuator
750-258-P2	Bearing Shaft
070-779	Ball Bearing
750-652-G1	Carousel
750-650-P1	Aperture Plate (without Dowel Pin)
070-1253	Dowel Pin
750-651-P1	Resistor Network Support
750-655-P1	Resistor Network Insulator
750-642-G1	Resistor Network
750-661-P1	Contact Terminal (Carousel component)
750-656-P1	Crystal Insulator (Carousel component)
321-038-P6	Leaf Spring (Carousel component)
750-657-P1	Grounding Leaf Spring
750-671-P1	Torsion Spring
750-626-P1	Spring
750-647-P1	Spindle
070-1268	Spindle Bearing (Spindle component)
070-1254	E-Ring (Spindle component)
750-660-P1	Location Screw (Spindle component)

P/N	Description
007-126	0.125" x 30" (3.175 mm x 762 mm) seamless tubing
070-201	#4 Split Lock Washer
084-004	#4-40 x .187 Hex Socket Head Screw
070-398	Retaining Ring
070-867	Shaft Spacer
070-170	#2 Split Lock Washer
070-177	#4-40 x 3.12 Hex Head Screw
080-038	#0-80 x .375 Phillips Pan Head Screw
082-032	#2 Internal Lock Washer
082-045	#2-56 x .187 Phillips Screw
084-054	#4 Split Lock Washer
082-022	#2 Flat Washer
082-024	#2-56 x .250 Hex Socket Screw
082-032	#2 Internal Lock Washer
750-292-P2	Detent Spacer
080-013	#0-80 Split Washer
080-007-P1	#0-80 x .170 Flat Washer
080-009-P1	#0-80 x .188 Socket Head Screw
084-048	#4-40 x .250 Flat Head Screw
750-665-P1	#2-56 Torsion Spring Shoulder Screw
070-170	#2 Split Lock Washer
082-045	#2-56 x .187 Phillips Screw
070-201	#4 Split Lock Washer
084-093	#4-40 x 1.125 Socket Head Screw
086-084-P2	#6-32 x .125 Set Screw
086-041	#6 Flat Washer
086-038	#6 Split Lock Washer
086-036	#6-32 x 3/8 Socket Head Screw
086-084-P2	#6-32 x .125 Set Screw

Crystal 12 Sensor (continued)

Dimensions

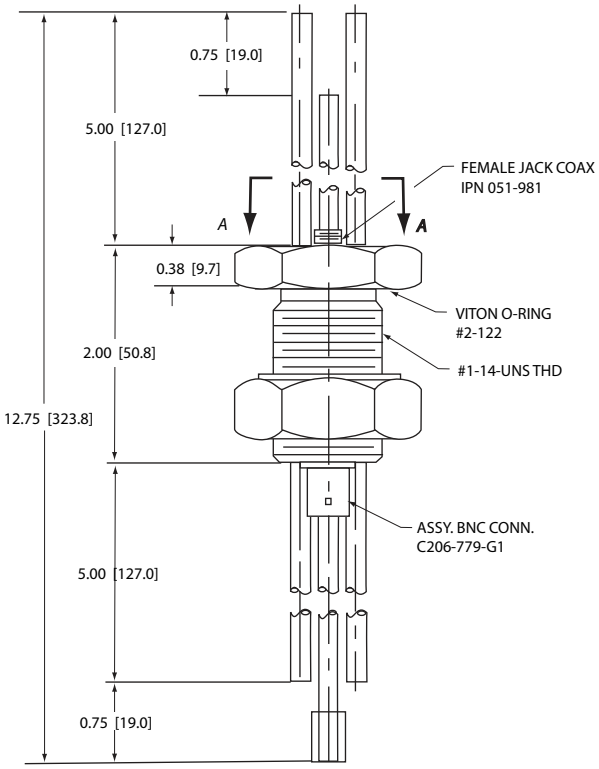
XL12 series Crystal 12 Sensor

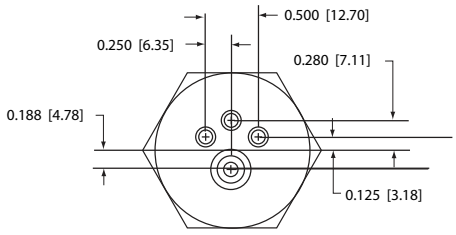


Dimensions

The Crystal 12 sensor can be used with the following Feedthroughs:

P/N 750-030-G1



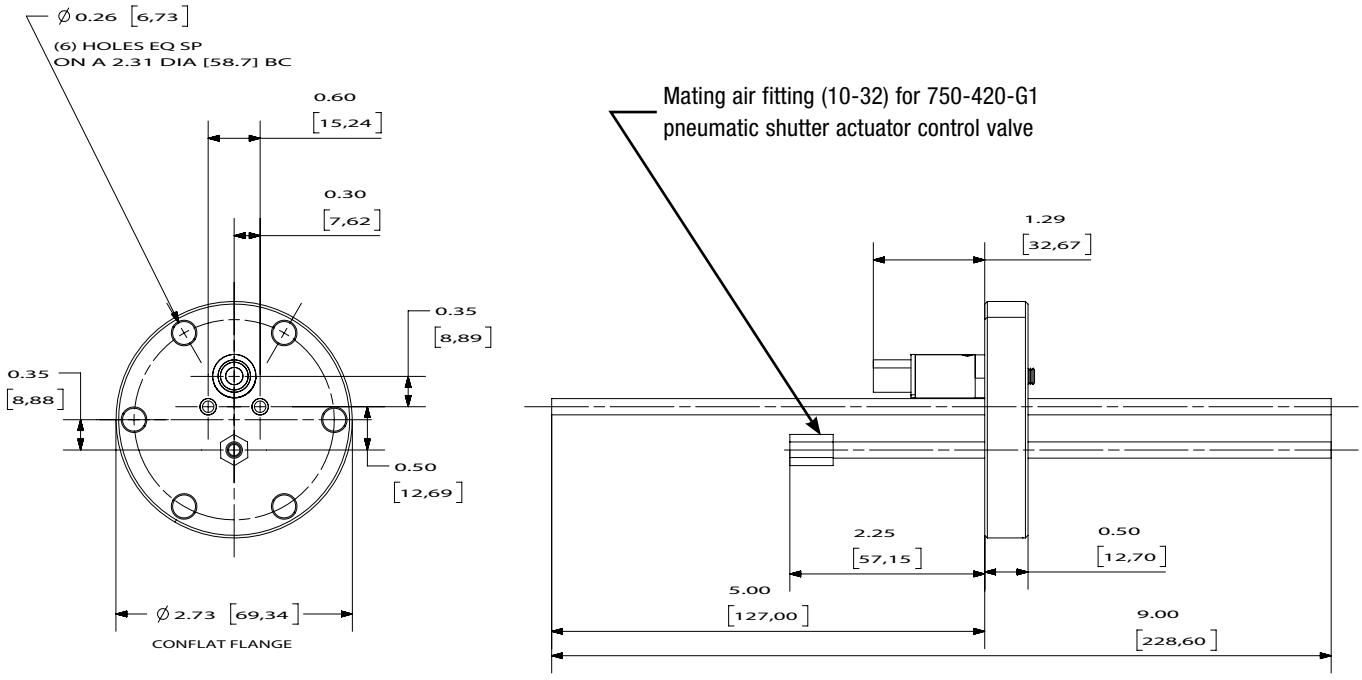


VIEW "A - A"

Crystal12 Sensor (continued)

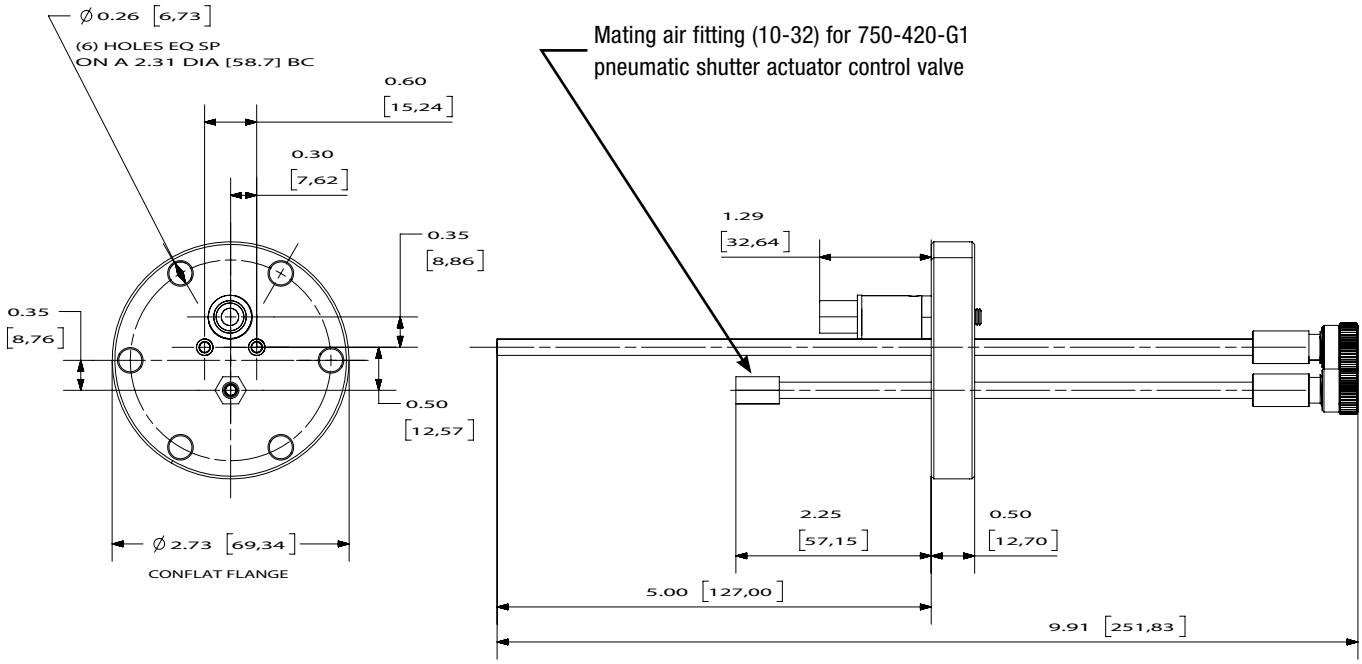
Dimensions

P/N 750-685-G1



Dimensions

P/N 750-685-G2



CrystalSix Sensor

The INFICON CrystalSix sensor is critical for long processes demanding continuous rate control. Whether an OLED, MBE, solar, long optical coating, or other processes having an extended period between chamber venting, the CrystalSix sensor offers the security of 6 quartz monitor crystals in one sensor head. When used with an INFICON Thin Film Controller the CrystalSix automatically rotates a new crystal into position whenever the current crystal fails or becomes unstable. Crystals are automatically replaced without interrupting your process for continued deposition rate monitoring.

Crystal indexing is accomplished with a pneumatically driven mechanism. This pneumatically driven motor provides better crystal thermal stability than competitive units using expensive in-vacuum, heat generating, electric motors. One-eighth inch water cooling tubes keep the sensor head thermally stable and allow flexibility in sensor placement.

When used with certain INFICON thin film controllers, the sensor provides position feedback so specific positions can be used with specific materials.

Advantages

- Holds 6 crystals with robust, automatic switching to maximize process uptime
- Stable crystal temperature, because crystal switching is pneumatically-driven (competitive units use heat-generating motors)
- 1/8" tubes maintain thermal stability and allow flexibility in sensor placement
- Optional crystal shutter available

CrystalSix Sensor (continued)

Ordering Information

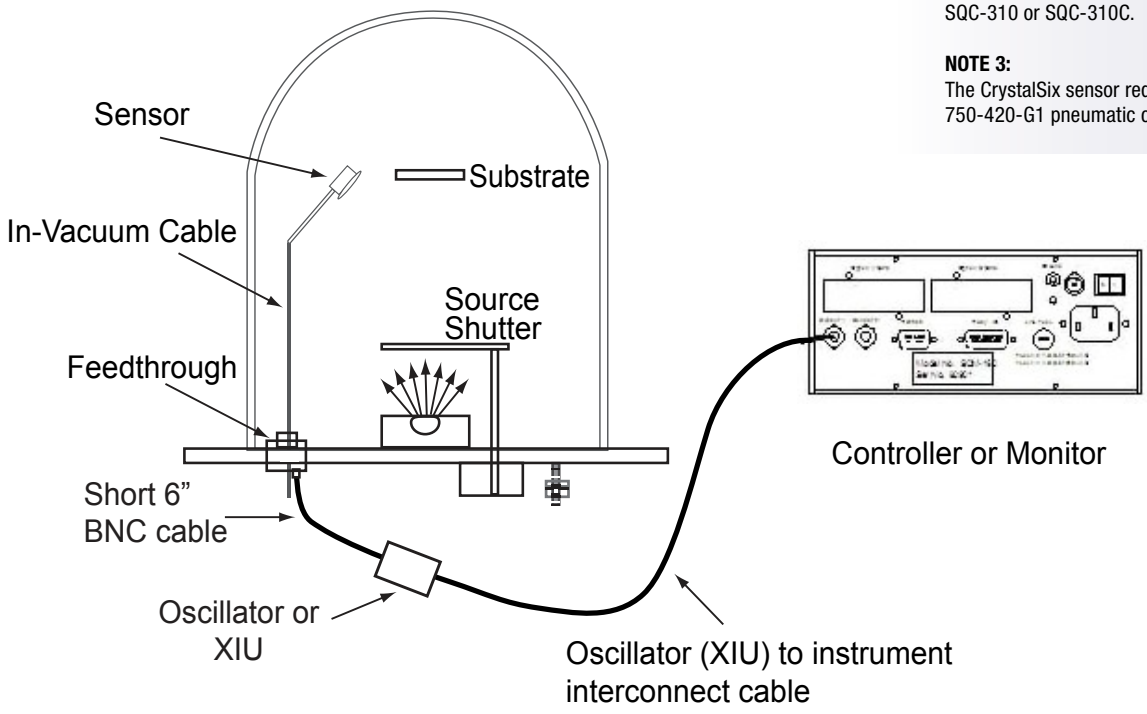
CrystalSix Sensor

CrystalSix Sensor 750-446-G1
CrystalSix Sensor with Shutter.....SPS-1039-G1

NOTE 1:
Auto Crystal Switch only with IC6, IC/5, Cygnus, XTC/3M, XTC/3S, SQC-310, and SQC-310C

NOTE 2:
Position feedback is not available with SQC-310 or SQC-310C.

NOTE 3:
The CrystalSix sensor requires the 750-420-G1 pneumatic control valve.



CrystalSix Sensor (continued)

Specifications

750-446-G1 CrystalSix Sensor Specifications

Maximum bakeout temp with no water	130°C
Maximum operating isothermal environment temperature with minimum water flow	400°C
Water, air and coax length	Standard 30" (76 cm)
Crystal exchange	Front-loading, extraction tool required (supplied with unit)
Mounting	Six #4-40 tapped holes on the back of the sensor body
Size (maximum envelope)	3.8" (9.7 cm) dia. x 2.0" (5.1 cm) high
Installation Requirements	
Feedthrough	Qty (1) 2¾" ConFlat® with two coaxial feedthroughs, two pass water, one air IPN 002-080, or Qty (1) 1" bolt with one coaxial feedthrough, two pass water, one air IPN 750-030-G1,
Other	User to provide vacuum-tight braze joints or connectors for the water and air tubes
	Valve assembly for air, IPN 750-420-G1 (not provided), with a 0.022" restrictor orifice installed by the user. (Orifice included with CrystalSix accessory kit) XIU or Oscillator designed to interface with the deposition controller Deposition controller must have been designed for this specific crystal sensor (INFICON XTC/2, XTC/C, IC/4, IC/4 PLUS, IC/5, Cygnus, XTC/3M, STC/3S, SQC310, SQC310C)
Utilities	
Minimum water flow	150-200 cc/min, 30°C max (Do not allow water to freeze) Coolant should not contain chlorides as stress corrosion cracking may occur
Regulated air supply	80-90 PSIG (5.5 bar - 6.2 bar) [550 kPa - 620 kPa] 2 meter maximum length of 1/8" tubing between bellows assembly and the control valve
Materials	
Plate, holders, material shield, mechanical parts	304 type stainless steel
Springs, electrical contacts	Au plated Be-Cu, Au Plate Inconel, 303 stainless steel
Water and air tubes	S-304, 0.125" (0.32 cm) O.D. x .016" (.04 cm) Wall Thickness 30" Long (76 cm) seamless stainless steel tubing
Connector (Microdot®)	Stainless steel
Insulators	>99% Al_2O_3
Cable	Teflon® insulated copper
Crystal	0.550" Diameter
Body and carousel	2024 T351 Aluminum

CrystalSix Sensor (continued)

Spare Parts List

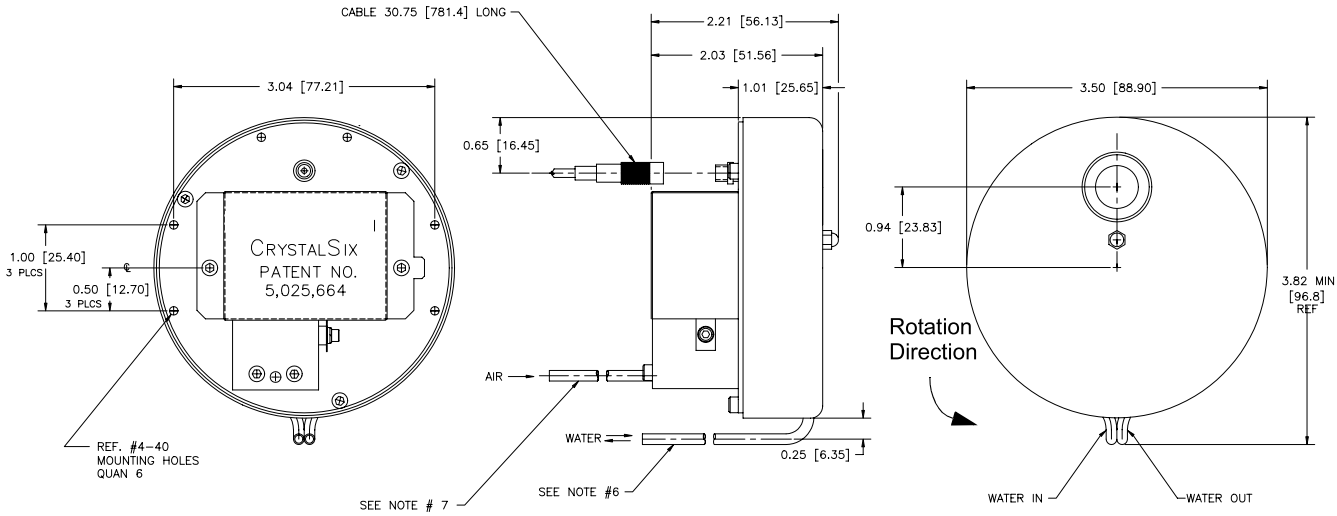
CrystalSix Sensors

P/N	Description
007-007	Retaining Spring (part of Crystal Holder)
007-023	Ceramic Retainer
007-044	In-vacuum Cable 30.75 in / 78 cm.
070-0170	#2 Lockwasher (part of Heat Shield Assembly)
070-0398	Retaining Ring (secures bearing located next to Pawl & Actuator Stem)
070-0777	Compression Spring (on Carousel shaft)
070-0778	Ball Bearing (underneath Carousel)
070-0779	Bearing (makes contact with Pawl & Actuator Stem)
070-0870	Teflon Washer (on Carousel shaft)
070-0877	Shim Spacer (part of Heat Shield Assembly)
070-0879	Bearing (at center of Top Plate Weld Assembly)
073-114	Wire .022 in. x 1.06 in. (clamps Heat Shield Retaining Pin)
082-026	#2-56 Nut (part of Heat Shield Assembly)
750-048-P1	Retaining Spring (clamps Crystal Holders to Carousel)
750-175-P1	Bottom Insulator (underneath Leaf Springs)
750-188-P2	Leaf Spring
750-249-P2	Retaining Pin (part of Heat Shield Assembly)
750-250-G1	Heat Shield Assembly
750-256-P2	Extension Spring (part of Top Plate Weld Assembly)
750-257-P3	Corrugated Spring 4.40 in / 11.2 cm
750-261-G1	Carousel Assembly (includes resistor network and electrical contacts)
750-262-G1	Crystal Holder
750-265-G1	Top Plate Weld Assembly
750-276-P2	Actuator Cover
750-278-P2	Water Line
750-286-P2	Bellows Assembly
750-290-P3	Carousel Electrical Contacts (set of 8)
750-291-P1	Detent
750-293-P2	Ratchet
750-294-P2	Stop Ratchet
750-295-G1	Pawl & Actuator Stem
750-336-G1	Resistor Network Assembly
750-338-P1	Contact Insulator (underneath Carousel Electrical Contacts)

CrystalSix Sensor (continued)

Dimensions

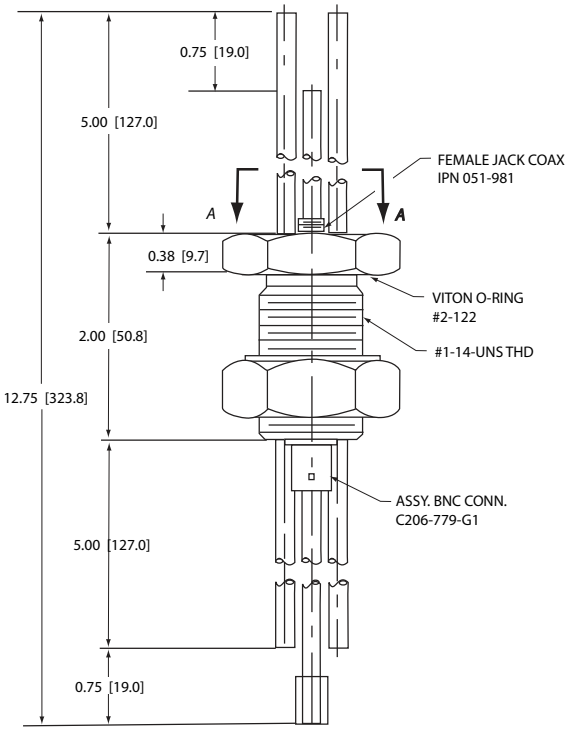
750-446-G1 CrystalSix Sensor

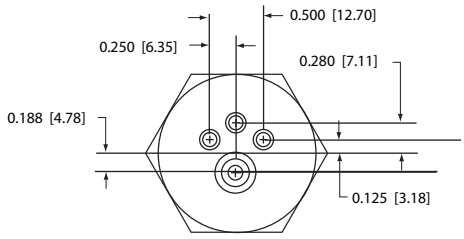


Dimensions

The CrystalSix Sensor 750-446-G1 can be used with the following Feedthroughs:

P/N 750-030-G1



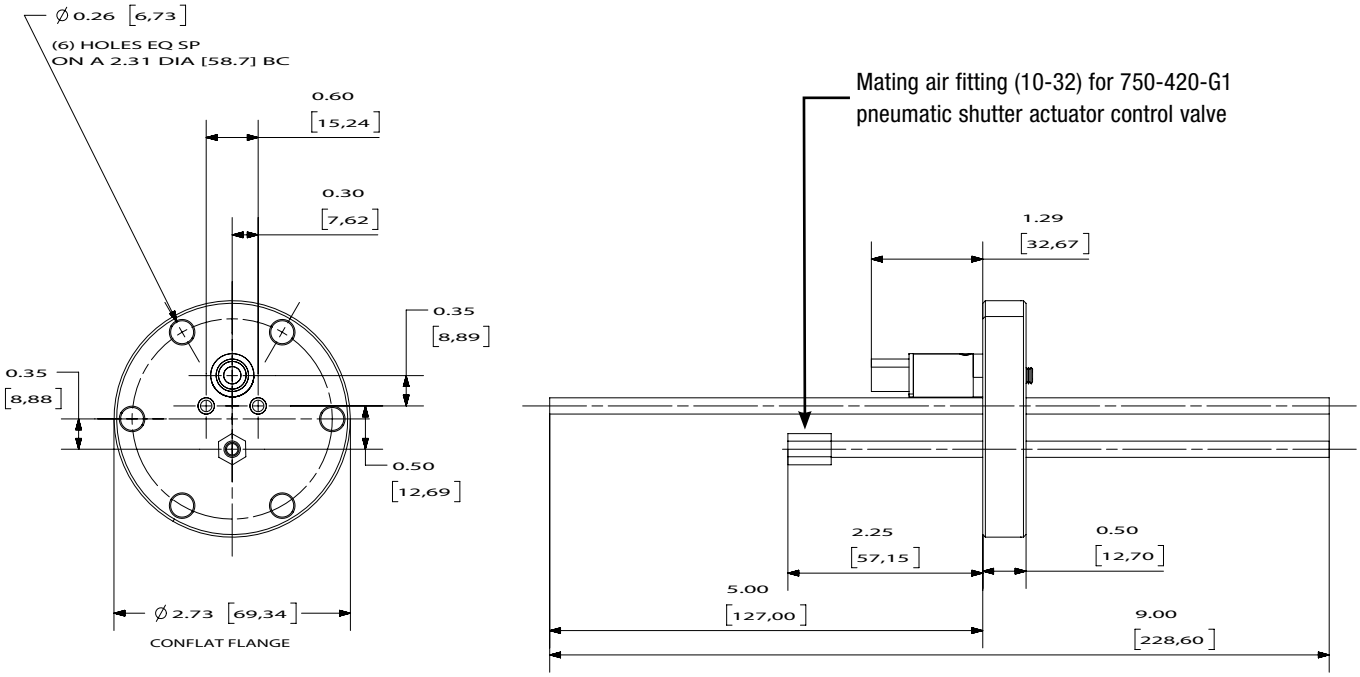


VIEW "A - A"

CrystalSix Sensor (continued)

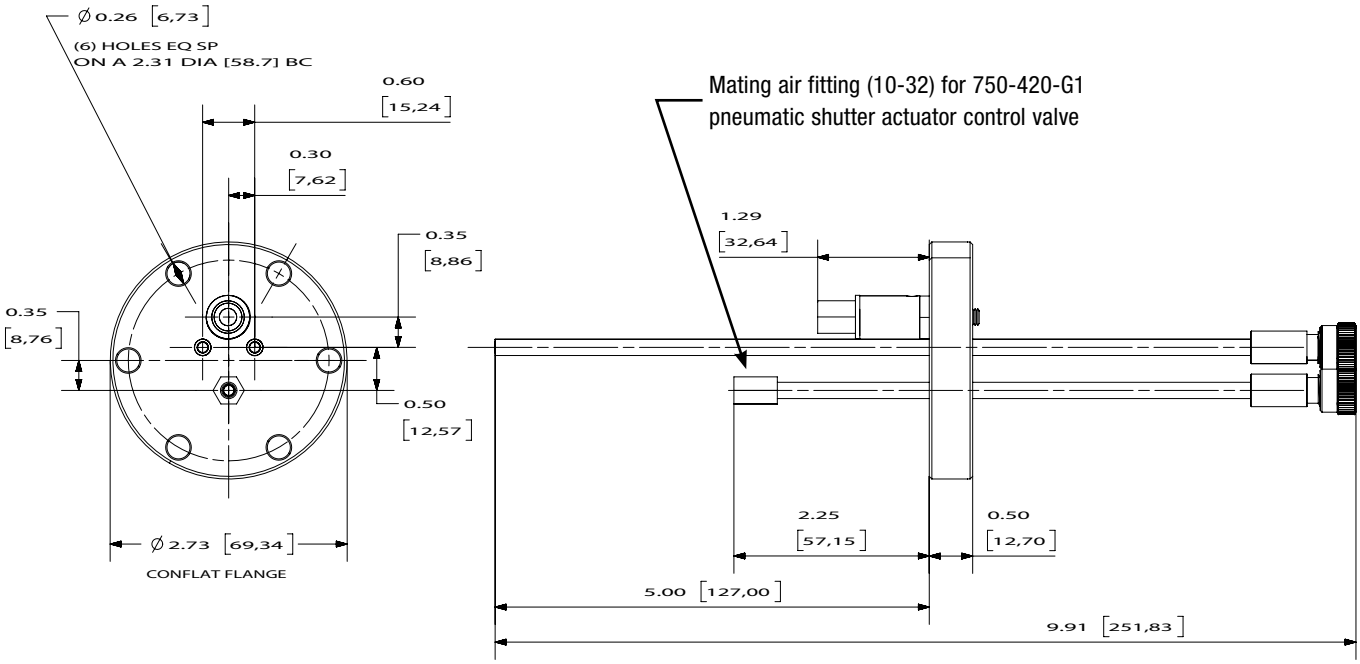
Dimensions

P/N 750-685-G1



Dimensions

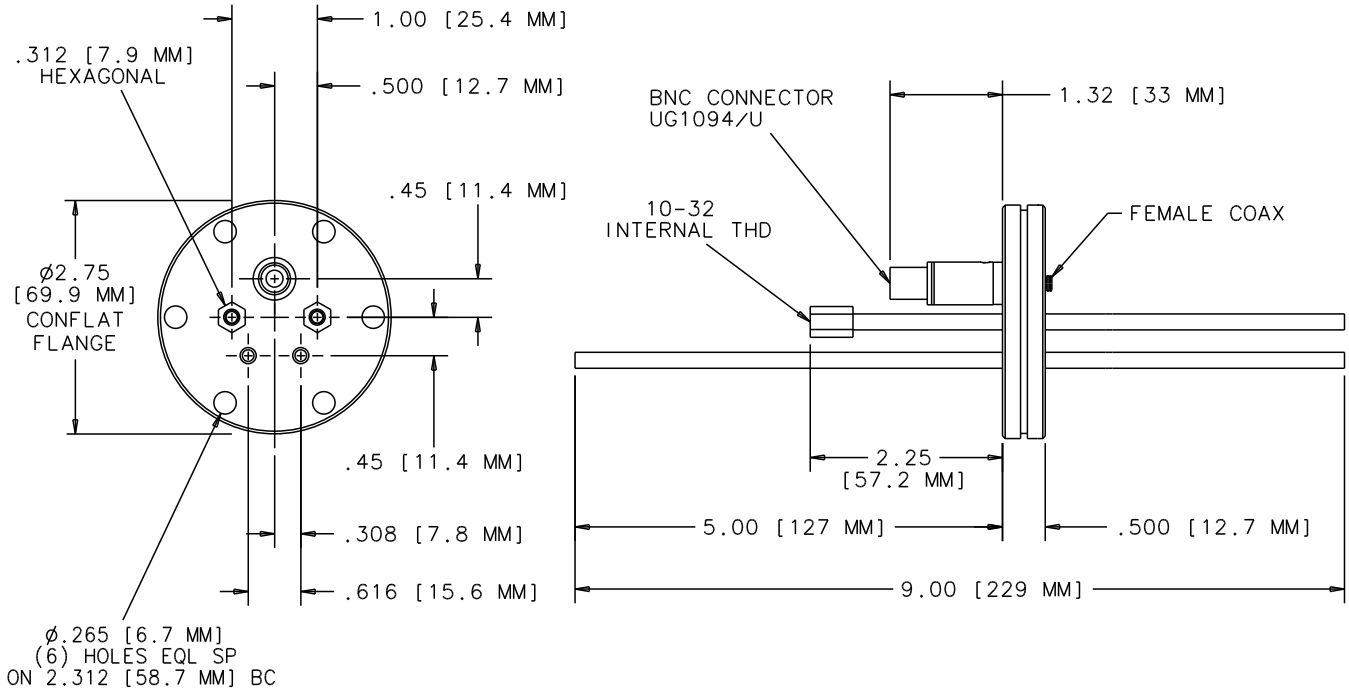
P/N 750-685-G2



CrystalSix Sensor (continued)

Dimensions

The CrystalSix Sensor with shutter SPS-1039-G1 can be used with Feedthrough P/N 750-683-G1



RSH Rotary Sensor Head

RSH-600 Series Rotary Sensor Heads are designed for demanding processes, employing very thick films and several different materials.

SENSOR CONFIGURATIONS

The RSH-600 Series hold six crystals in a thermally shielded, water cooled housing, ensuring excellent crystal performance in temperature environments up to 300°C. Crystals are housed in an easy to remove Teflon® and stainless steel crystal holder. Crystal position is incremented by applying a 1 second pulse to a 115 VAC/36mA or 24 VDC/29mA pneumatic valve. A 7-pin connector provides individual switch closures to ground to indicate the current crystal position.

Crystal retainer assembly and standard stainless steel cover

FEEDTHROUGHS

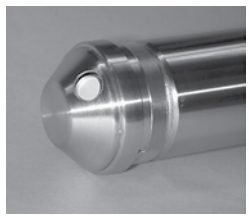
The RSH-600 Series can be configured with a flat head for top mount installation through an o-ring sealed feedthrough (not included). The 45° angle head can be configured for installation through the side of the chamber.

Standard head covers are made of stainless steel. Copper head covers are available for applications where temperature is a concern.

Copper Head Cover

The RSH-600 is available in these adjustable lengths:

- in-vacuum length = up to 200 mm (7.9")
- in-vacuum length = up to 350 mm (13.8")
- in-vacuum length = up to 450 mm (17.7")
- in-vacuum length = up to 540 mm (21.3")
- in-vacuum length = up to 650 mm (25.6")
- Longer lengths up to 860 mm (33.9") are also available.



45° Angle Head

Advantages

- Six crystals
- Position feedback
- Adjustable length
- Rugged design

RSH Rotary Sensor Head (continued)

Ordering Information

Rotary Sensor Head - RSH-600 Sensor

1	5	3	2	0		–		

Voltage

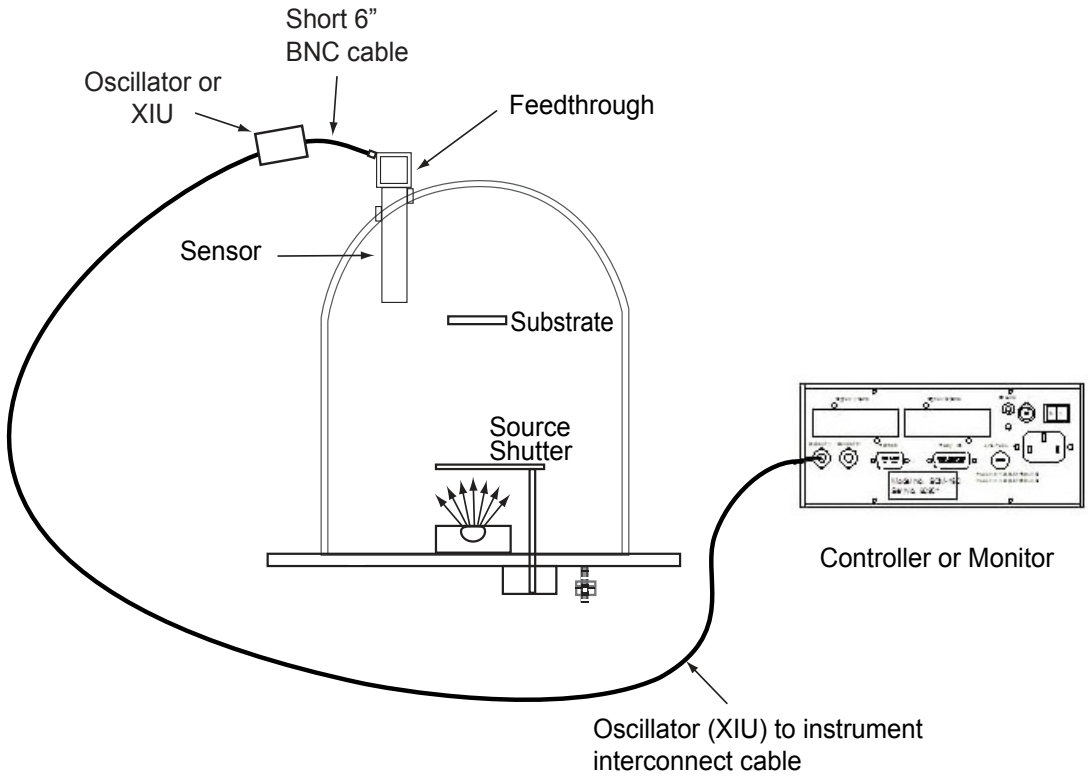
1	115 volts
2	24 volts

Type of sensor

Stainless Steel Flat Head	6
Stainless Steel Angle Head	7
Copper Flat Head	8
Copper Angle Head	9

Length of Sensor (internal length)

200 mm (7.9")	0
350 mm (13.8")	1
450 mm (17.7")	2
540 mm (21.3")	3
650 mm (25.6")	4
Custom Length	5



RSH Rotary Sensor Head (continued)

Specifications

RSH600 Specifications

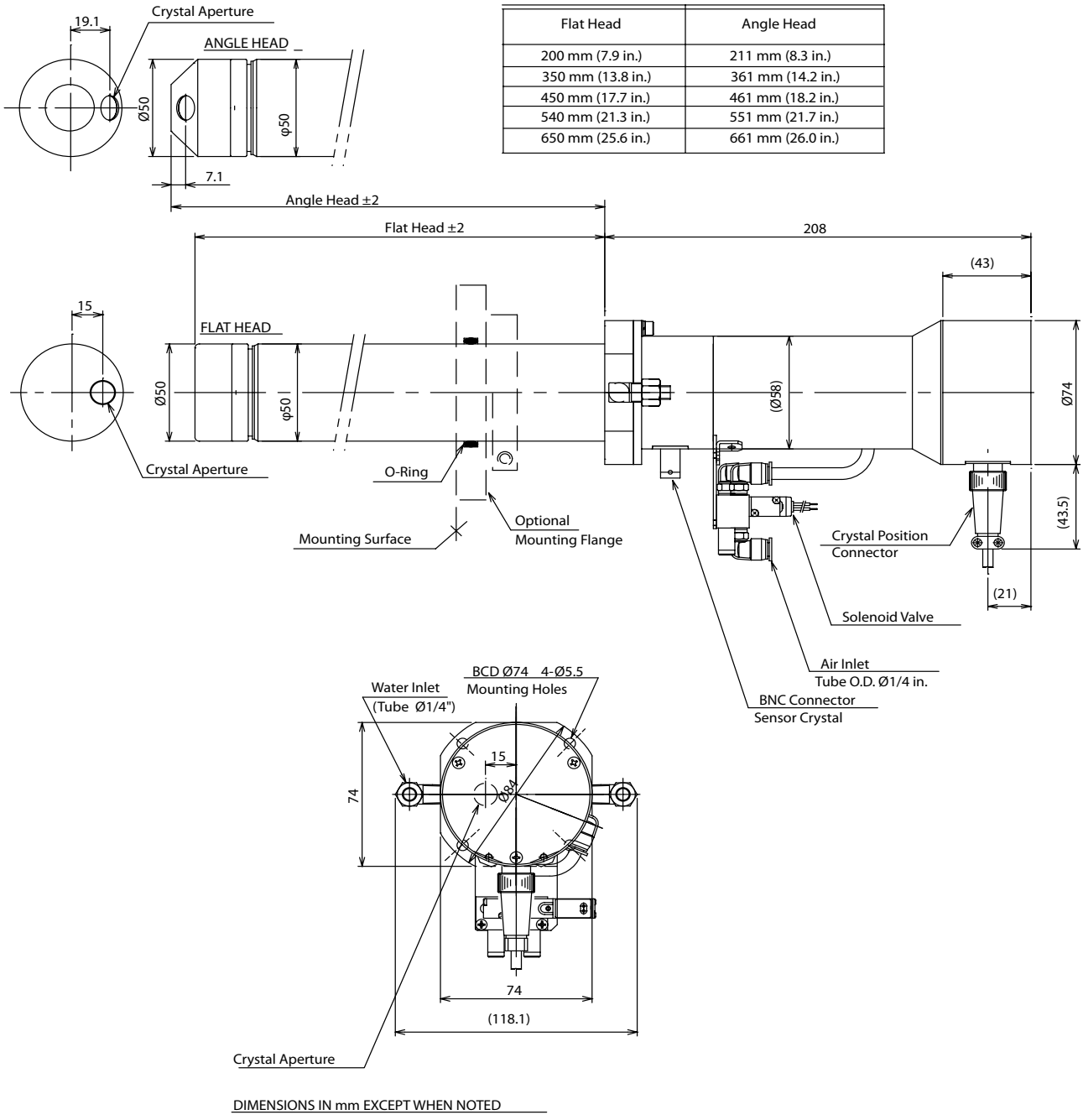
Number of crystals	6
Crystal size	0.550" diameter
Installation aperture	2.0" diameter
Overall length	See chart on the following page
Adjustable length in vacuum	See chart on the following page
Power requirement	115VAC/50 mA or 24VDC/20 mA
Crystal switching method	Air Actuated @ 55psi (4kg/cm2) regulated
Cooling method	Water-cooled @ 5L/m at 2kg/cm2 (28psi) (Do not allow to freeze)
Air and water connections	(1) ¼" quick connect for air, (2) ¼" compression fittings for water
Maximum bakeout temperature without water	130ºC
Operating temperature	300°C max with water cooling and Standard Head Cover 400°C max with water cooling and Copper Head Cover
Weight	RSH-600 ~ 8.5 lb. (3.8kg), varies with overall length

Spare Parts List

P/N	Description
153202	Adjustable Flange
153204	Crystal Retainer Assembly - Flat
153204-2	Crystal Retainer Assembly - Angled
153706	Spring Retainer Assembly - Flat
153707	24VDC Solenoid Valve Assembly
153708	Head Cover - SS- Flat
153709	Retaining Screw for Flat Crystal Retainer
153710	Crystal Holder - Flat (includes 153709)
153713	Head Cover - SS - Angled
153714	Spring Retainer Assembly - Angled
153715	Retaining Screw for Angled Crystal Retainer
153716	Crystal Holder - Angled
153722	Signal and Ground Contact Module
153724	Spring Retainer Contact Kit - Flat (set of 6)
153726	Spring Contact for Crystal Retainer Assembly
153731	Head Cover - CU- Flat
153731-2	Head Cover - CU - Angled
889128	7-pin Male Connector
889128-2	7-pin Female Connector
144-101	M3x6 SOC Head Screw for Flat Crystal Retainer

RSH Rotary Sensor Head (continued)

Dimensions



Flat Head	Angle Head
200 mm (7.9 in.)	211 mm (8.3 in.)
350 mm (13.8 in.)	361 mm (14.2 in.)
450 mm (17.7 in.)	461 mm (18.2 in.)
540 mm (21.3 in.)	551 mm (21.7 in.)
650 mm (25.6 in.)	661 mm (26.0 in.)

DIMENSIONS IN mm EXCEPT WHEN NOTED

Quartz Crystals

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INFICON Quartz Crystals

GET THE HIGH QUALITY INFICON CRYSTALS YOU WANT, WHEN YOU WANT THEM, AT AN AFFORDABLE PRICE.

INFICON quartz crystals meet all your requirements for reliability, availability and affordability. From raw quartz to finished monitor crystal, no one else can promise complete quality control. Because, now, the major supplier of blank quartz crystals is part of INFICON.

DELIVERING JUST THE RIGHT CRYSTAL

Available in 5 and 6 MHz with silver, gold, or stress-reducing alloy electrodes, INFICON quartz crystals are produced to stringent specifications and carefully inspected to assure high yields and optimum reliability. Our AT-cut plano-convex design reduces errors in deposition rate and thickness by minimizing spurious vibrational modes (or mode hopping). And you now have a choice of sizes: Sloan-style or INFICON standard. Plus a high-level of available inventory to meet both your immediate and long-term requirements. We also offer the flexibility to produce crystals to your specific sizes and frequencies.

CHOOSING THE RIGHT CRYSTAL

Our continuing research into quartz crystal characteristics results in ongoing improvements to offer the highest reliability in your process. We recommend gold crystals for most applications. However, silver crystals will provide superior performance in processes with high heat loads, such as sputtering. They may also improve the deposition of oxides. And alloy crystals are recommended for optical coating with dielectric materials and for semiconductor processes with high-stress materials.

THREE CONVENIENT PACKAGES

- Clean-room compatible dispenser—holds 10 crystals which can be dispensed directly into the sensor holder or with the tool provided.
- Flat-pack carousel dispenser—holds 10 crystals which are extracted by vacuum pencil or dispensed directly into the holder.
- Compact box—holds 10 crystals which are extracted by vacuum pencil or tweezers.

A COMPLETE LINE OF THIN FILM CONTROL INSTRUMENTS

However simple or complex your system—whether it involves thermal evaporation, sputtering or ion beam processes—INFICON makes a complete line of controllers, monitors, sensors and feedthroughs to meet your needs.

100% TESTING AND INSPECTION

To ensure maximum lifetime in your process and stable and accurate rate control, each crystal is examined for:

- Resistance—Resistance is checked to assure measurement stability and longer coating life. Resistance is an indicator of electrical contact and electrode adhesion.
- Frequency—Starting frequency within a small specification range is verified to ensure accurate thickness measurement.
- Curvature—An electrical test for curvature is performed to assure resonance stability. Poor curvature results in measurement stability degrading more rapidly.
- Visual Conformity—Each crystal is inspected for electrode uniformity, surface flaws, and other imperfections that are indicators of poor electrode adhesion and contamination

Ordering Information

Description	Part Number
6 MHz Gold, in clean-room compatible dispenser	008-010-G10
6 MHz Silver, in clean-room compatible dispenser	008-009-G10
6 MHz Alloy, in clean-room compatible dispenser	750-679-G1
6 MHz Gold, in flat-pack carousel dispenser	750-1000-G10
6 MHz Silver, in flat-pack carousel dispenser	750-1001-G10
6 MHz Alloy, in flat-pack carousel dispenser	750-1002-G10
6 MHz Gold, in compact box	SPC-1093-G10
6 MHz Silver, in compact box	750-1014-G10
6 MHz Alloy, in compact box	750-1015-G10
5 MHz Gold, in clean-room compatible dispenser	750-225-G2
5 MHz Silver, in clean-room compatible dispenser	750-226-G2
5 MHz Alloy, in clean-room compatible dispenser	750-678-G1
5 MHz Gold, in flat-pack carousel dispenser	750-1005-G10
5 MHz Silver, in flat-pack carousel dispenser	750-1006-G10
5 MHz Alloy, in flat-pack carousel dispenser	750-1007-G10
5 MHz Gold, in compact box	750-1016-G10
5 MHz Silver, in compact box	750-1017-G10
5 MHz Alloy, in compact box	750-1018-G10

Crucible Indexer

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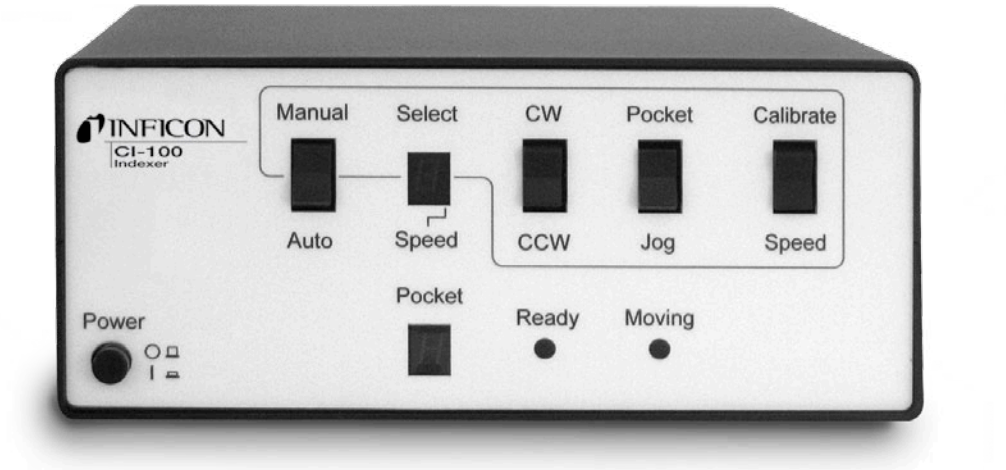
Crucible Indexer



AFFORDABLE, RELIABLE CONTROL OF MULTI-POCKET E-BEAM SOURCES

The CI-100 Crucible Indexer is used to rotate multi-pocket electron beam sources through a rotary vacuum feedthrough. It consists of a controller, motor drive, mounting bracket, and interconnecting cable. Configuration is flexible to adapt to your specific system and process. The CI-100 is compatible with virtually all e-beam sources, and the digital I/O is compatible with existing indexers.

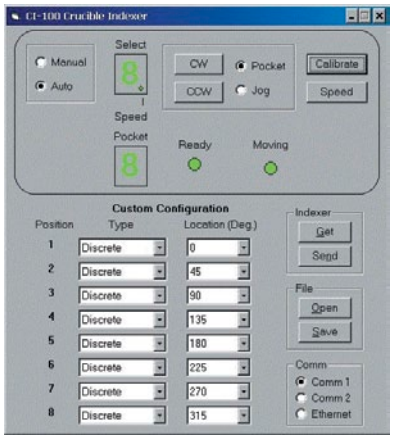
SIMPLE, INTUITIVE SETUP AND OPERATION

From the front panel, you can control your process with ease:

- Indicate selected pocket, or sweep speed if on a banana.
- Select control from the front panel, or through external I/O.
- Move indexer clockwise or counter-clockwise.
- Move indexer to next pocket, or jogs in 1.8º steps.
- Calibrate position or set speed.
- Indicate selected pocket.
- Indicate indexer is positioned at a valid pocket.
- Indicate indexer is moving.

Advantages

- Direct drive - no pulleys to set or adjust
- Electronic calibration of position - no mechanical adjustments
- Small, cool-running high-torque 200 oz-in motor drive
- Mounts on standard 1" bolt or 2-3/4" CF feedthroughs
- User-configurable for any pocket/banana layout
- 8 predefined pocket/banana configurations included
- Digital I/O compatible with existing indexers



System Configuration Setup - You can easily customize your configuration with the simple Windows®-based software included.

Specifications

Motor Drive

Motor type	micro-stepper
Torque	1.4 N-m (200 oz-in)
Speed (RPM)	low: 0.05, 0.06, 0.08, 0.10, 0.12, 0.15, 0.19, 0.24, 0.30, 0.37
	high: 0.5, 0.6, 0.8, 1.0, 1.2, 1.5, 1.9, 2.4, 3.0, 3.7
Resolution	1.8º
Repeatability	0.25º
Size (height x width x depth)	89 x 89 x 122 mm (3.5" x 3.5" x 4.8")
Weight	1.5 Kg (3.2 lbs)
Power	12 W (supplied by controller)

Controller

Pockets	up to 8
Digital inputs	binary or BCD encoded
	low = 0 to 2 Vdc, high = 4 to 24 Vdc, non-isolated
Communications	RS-232 or Ethernet
Size (height x width x depth)	88 x 213 x 197 mm (3.5" x 8.4" x 7.75")
Weight	2.7 kg (6 lbs)
Power	100-120 / 200-240 Vac, 50/60 Hz, 20W
Compliance	CE (LVD & ECD)
Interconnecting cable	10ft (3m), standard DB25

Motor Drive Mount - shown with mounting bracket and flexible coupling attached.

INFICON Instruments for Intelligent Control®

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