



# Optical Cryostat - High Vacuum

The **CS202\*1-DMX-1SS** is a high performance closed cycle cryostat for Optical, Electrical, and Magnetic sample testing. It has an all stainless steel vacuum shroud along with a welded stainless steel instrumentation skirt. The system is capable of vacuum levels of  $10^{-7}$  Torr with an appropriate vacuum pump.

## Applications

- Optical
- Raman
- UV, VIS, IR
- FTIR
- Electro & Photoluminescence
- Resistivity/Hall Probe Experiments
- Diamond Anvil Cell
- Magneto-Optical
- PITS / DLTS
- Thermal, Electrical and Magnetic Susceptibility
- Magneto Optical Kerr Effect (MOKE)

## Features

- Cryogen Free, Low Power
- High Performance Stainless Steel Construction
- Large clear view optical windows (1.25 in)
- Large sample viewing angle for optical collection (F/0.8)
- Can operate in any orientation
- Fully customizable

## Typical Configuration

- Cold head (DE-202Al)
- Compressor (ARS-2HW)
- 2 Helium Hoses
- Stainless Steel vacuum shroud with 5 window ports for optical and electrical measures (DMX-1SS)
- Nickel Plated OFHC radiation shield
- 2 High purity quartz windows
- Instrumentation for temperature measurement and control:
  - 10 pin hermetic feed through
  - 36 ohm thermofoil heater
  - Silicon diode sensor curve matched to ( $\pm 0.5K$ ) for control
  - Calibrated silicon diode sensor ( $\pm 12$  mk) with 4 in. free length for accurate sample measurement.
- Wiring for electrical experiments:
  - 10 pin hermetic feed through
  - 4 copper wires
- Sample holder for optical and electrical experiments
- Temperature Controller

## Options and Upgrades

- 4K Coldhead (0.1W @ 4.2K)
- 5.5K Coldhead (1W @ 10K)
- 450K High Temperature Interface
- 800K High Temperature Interface
- Turbo upgrade for faster cooldown times
- Custom temperature sensor configuration (please contact our sales staff)
- Custom wiring configurations (please contact our sales staff)
- Window material upgrades (custom materials available)
- Sample holder upgrades (custom sample holders available)



The above picture shows a cryocooler with a vacuum shroud, radiation shield, and sample holder installed.



The above picture shows a complete system (minus the vacuum pump and temperature controller)



# Optical Cryostat - High Vacuum

## Cooling Technology-

DE-202	Closed Cycle Cryocooler
Refrigeration Type	Pneumatically Driven GM Cycle
Liquid Cryogen Usage	None, Cryogen Free

## Temperature\*-

DE-202AI	< 10K - 350K
DE-202PI	< 5.5K - 350K
DE-202SI	< 4.2K - 350K
With 800K Interface	(Base Temp + 2K) - 700K
With 450K Interface	(Base Temp + 2K) - 450K
Stability	0.1K
*Based on bare cold head with a closed radiation shield, and no additional sources of experimental or parasitic heat load	

## Sample Space -

Diameter	36 mm (1.44 in.)
Height	39 mm (1.53 in.)
Sample Holder Attachment	1/4 - 28 screw
Sample Holder	<a href="http://www.arscryo.com/Products/SampleHolders.html">www.arscryo.com/Products/SampleHolders.html</a>

## Optical Access-

Window Ports	5 - 90° Apart
Diameter	41 mm (1.63 in)
Clear View	32 mm (1.25 in)
#/F	0.8
Window Material	<a href="http://www.arscryo.com/Products/WindowMaterials.html">www.arscryo.com/Products/WindowMaterials.html</a>

## Temperature Instrumentation and Control - (Standard) -

Heater	36 ohm Thermfoil Heater anchored to the coldtip
Control Sensor	Curve Matched Silicon Diode installed on the coldtip
Sample Sensor	Calibrated Silicon Diode with free length wires
Contact ARS for other options	

## Instrumentation Access-

Instrumentation Skirt	Welded Stainless Steel
Pump out Port	1 - NW 25
Instrumentation Ports	2
Instrumentation Wiring	Contact sales staff for options

## Vacuum Shroud -

Material	Stainless Steel
Length	338 mm (13.3 in)
Diameter	70 mm (2.75 in)
Width	70 mm (2.75 in)

## Radiation Shield -

Material	Nickel Plated OFHC Copper
Attachment	Threaded
Optical Access	0, 2, or 4 (customer specified)

## Cryostat Footprint -

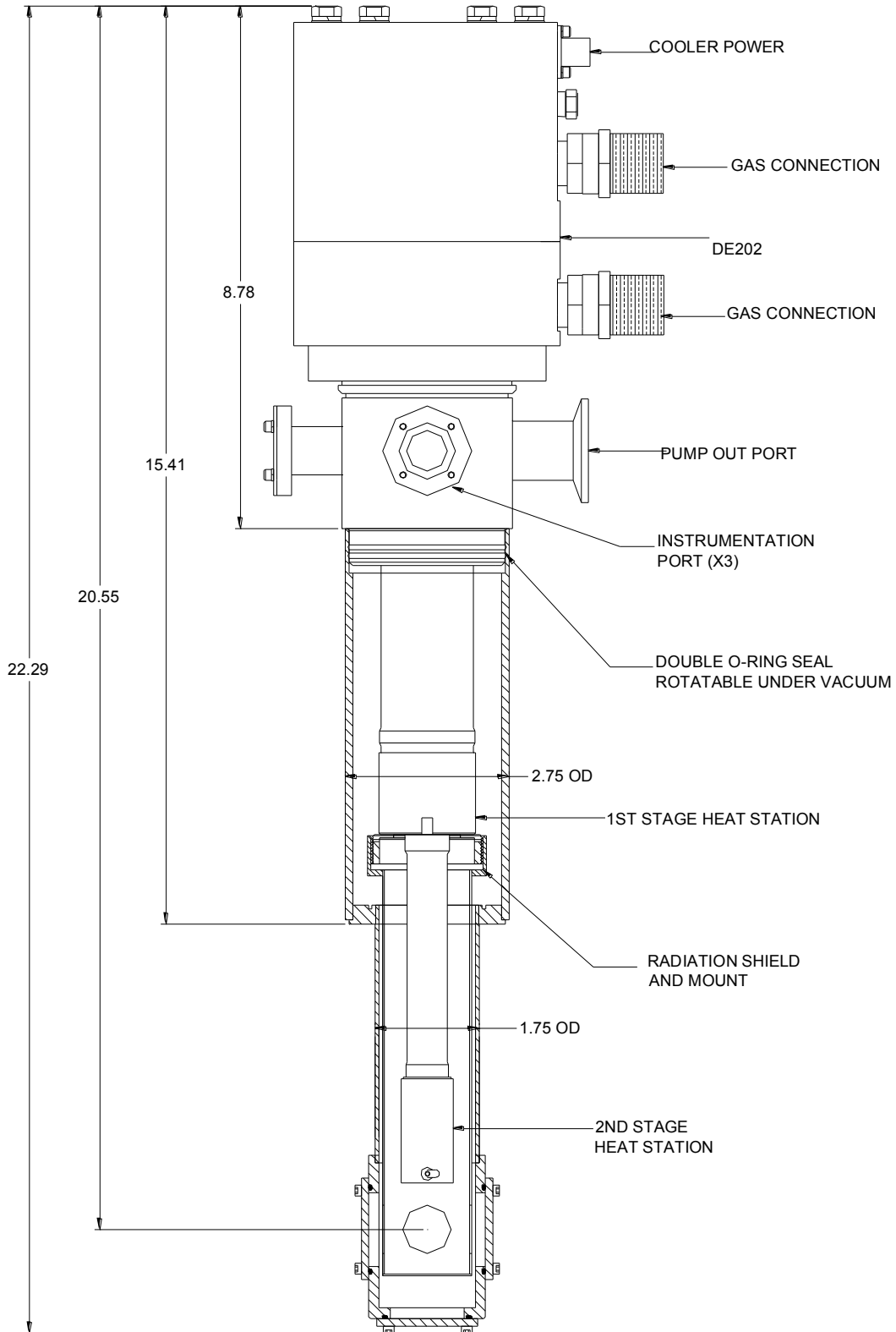
Overall Length	566 mm (22.29 in)
Motor Housing Diameter	114 mm (4.5 in)
Rotational Clearance	200 mm (8 in) with "G" Configuration

Cryocooler Model		DE-202AI		DE-202A(T)I		DE-202PI		DE-202SI	
		60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
	Frequency	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz
<b>Base Temperature</b>		<9K	<9K	<9K	<9K	<5.5K	<5.5K	<4.2K	<4.2K
<b>Cooling Capacity*</b>	4.2K	-	-	-	-	-	-	0.1W	0.08W
	10K	0.5W	0.4W	0.7W	0.56W	1W	0.8W	1.2W	1W
	20K	2.5W	2W	3.7W	3W	3.5W	2.8W	4W	3.2W
	77K	4W	3.2W	6W	4.8W	3.5W	2.8W	4W	3.2W
<b>Radiation Shield Cooling Capacity</b>		10W	8W	15W	12W	10W	8W	10W	8W
<b>Cooldown Time</b>	20K	50 min	60 min	35 min	42 min	60 min	72 min	60 min	72 min
	Base Temperature	70 min	84 min	50 min	60 min	90 min	108 min	90 min	108 min
<b>Compressor Model</b>		ARS-2HW		ARS-2HW		ARS-2HW		ARS-4HW	
<b>Typical Maintenance Cycle</b>		12,000 hours		8,000 hours		12,000 hours		12,000 hours	



# Optical Cryostat - High Vacuum

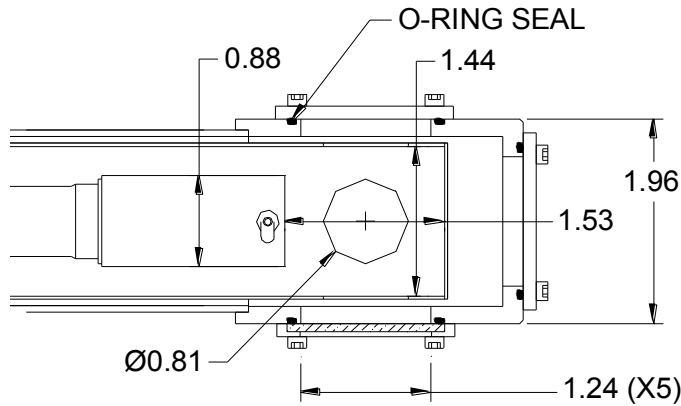
## DE202\*I-DMX-1SS Outline Drawing



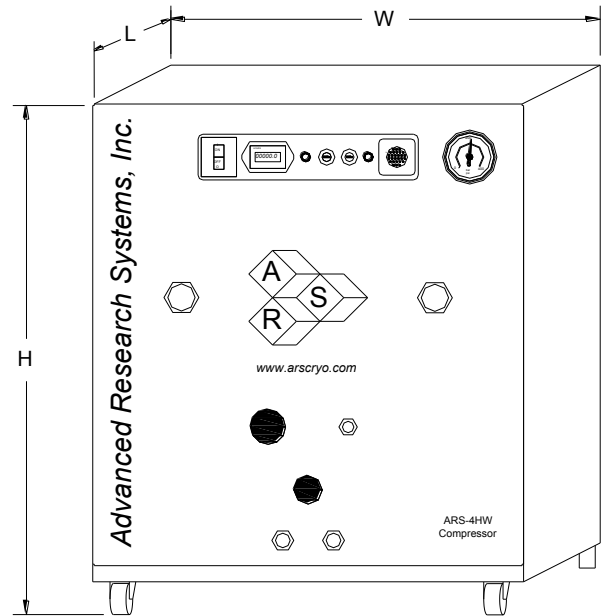


# Optical Cryostat - High Vacuum

**Sample Space**



**ARS-2HW/ARS-4HW Compressor**

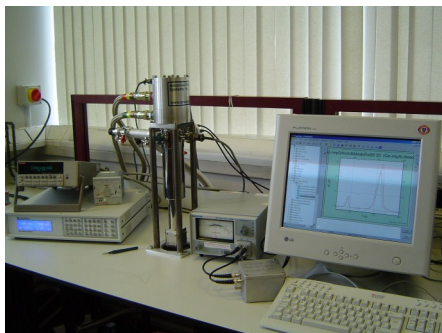


Compressor Model		ARS-2HW		ARS-4HW	
	Frequency	60 Hz	50 Hz	60 Hz	50 Hz
<b>Standard Voltage</b>	Min	208 V	190 V	208 V	190 V
	Max	230 V	210 V	230 V	210 V
<b>Transformer Options</b>	10%		220 V, 230V		220 V, 230 V
	15%		240 V		240 V
<b>Power Usage</b>	Single Phase	1.3 kW	1.2 kW	3.6 kW	3.0 kW
<b>Refrigerant Gas</b>		99.999% Helium Gas, Pre-Charged		99.999% Helium Gas, Pre-Charged	
<b>Noise Level</b>		60 dBA		60 dBA	
<b>Ambient Temperature</b>		12 - 40 C (54—104 F)		12 - 40 C (54 - 104 F)	
<b>Cooling Water</b>	Consumption	1.5 L / min (0.4 Gal. / min)		2.3 L / min (0.6 Gal. / min)	
	Temperature	10 - 35 C (50—95 F)		10 - 35 C (50—95 F)	
	Connection	3/8 in. Swagelok Fitting		3/8 in. Swagelok Fitting	
<b>Dimensions:</b>	L	483 mm (19 in)		483 mm (19 in)	
	W	434 mm (17.1 in)		434 mm (17.1 in)	
	H	516 mm (20.3 in)		516 mm (20.3 in)	
<b>Weight</b>		62 kg (137 lbs)		72 kg (160 lbs)	
<b>Typical Maintenance Cycle</b>		12,000 hours		12,000 hours	
<b>Water Recirculation Option</b>		CoolPac Compatible		CoolPac Compatible	



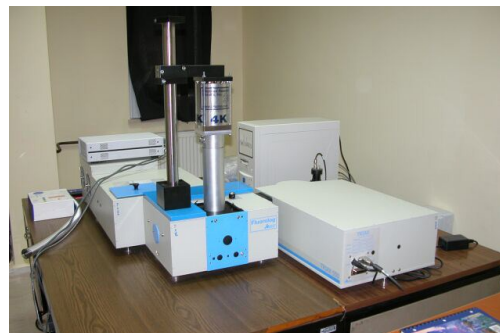
# Optical Cryostat - High Vacuum

## Optical Spectroscopy



Displex installed for spectroscopy.

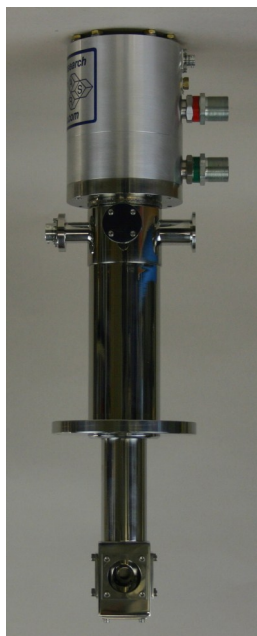
Courtesy: Dr. M. Gad , Sheffield Hallam University



Displex installed on a spectrometer.

Courtesy: Mehmet Turken

## FTIR



CS-202AI-DMX-1-2SS Designed for Bruker FTIR

## Matrix Isolation



System set up for Matrix Isolation. Mixing chamber lower right. Expander and sample can be manually rotated with respect to the shroud and window. Clamped shroud stays stationary during sample rotation.

Courtesy: Dr. Mary Price, Dublin University.