

## Phenix Specification

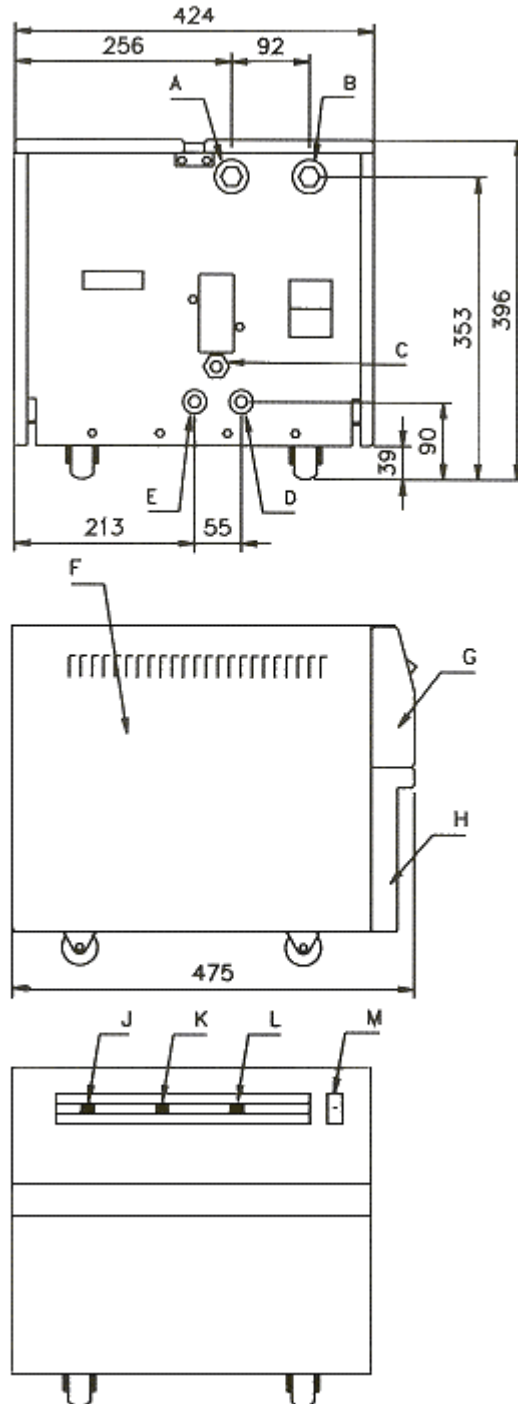
The Phenix helium cryostat from Oxford Cryosystems is supplied with three major component parts:

- Phenix Coldhead with Integrated GM closed cycle cooler
- CryoDrive® Compressor Unit
- Turbomolecular Pumping Unit with Two-Stage Rotary Pump

### **CryoDrive® Compressor**

<b>CryoDrive® Compressor</b>	<b>1.5 and 3 kW</b>
Power	(±6%) 200, 220, 240V, 1 ph, 50Hz or 200, 208, 220V, 1 ph, 60Hz
Running current	Cryodrive® 1.5 9A Cryodrive® 3.0 13A
Helium pressure-static	16.5±0.5bar at 21 to 27°C
Normal supply	21.0 ±0.5bar
Operating temperature	4 to 38°C
Adsorber service period	15,000 hours
Cooling water	typical flow 3 l*min-1 at 18°C
Noise	(dBA of 1m) < 75
Dimensions	424W x 396H x 460L
Weight	Cryodrive® 1.5 74kg - Cryodrive® 3.0 77kg
Connections	Gas supply connection 1/2" self sealing coupling Gas return connection 1/2" self sealing coupling Fill and vent port connection 1/4" self sealing coupling Cooling water connection 1/2" i.d. nozzle
Power supply cable	(captive) 3m line

- A - Helium in
- B - Helium out
- C - Electrical supply
- D - Water in
- E - Water out
- F - Gull wing side door
- G - Front panel and indicators ordering information
- H - Drop down door With pressure gauge, helium change/vent port and hours counter behind
- J - 'High temperature' LED
- K - 'Low pressure' LED
- L - 'On' LED
- M - Cyodrive 'on' switch



### **Closed Cycle Coldhead**

The Coolstar® Coldhead uses the Gifford McMahon refrigeration cycle. By adopting a simple pneumatic drive mechanism, the need for complex mechanical linkages is eliminated and the Coldhead can be driven by a small, low vibration stepper motor.

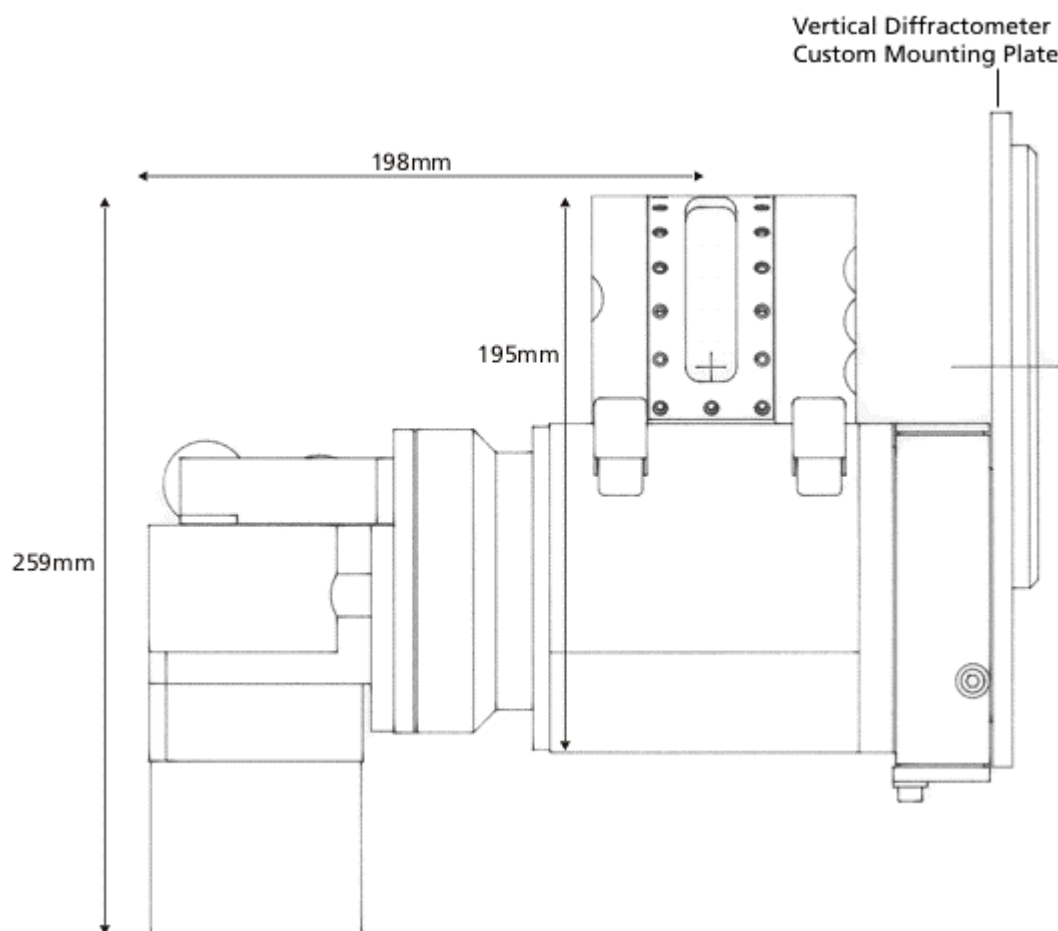
The design utilised in the PheniX system offers a unique approach to refrigeration control. Since motor speed can easily be regulated to vary the cycle rate, cooling power is controlled.

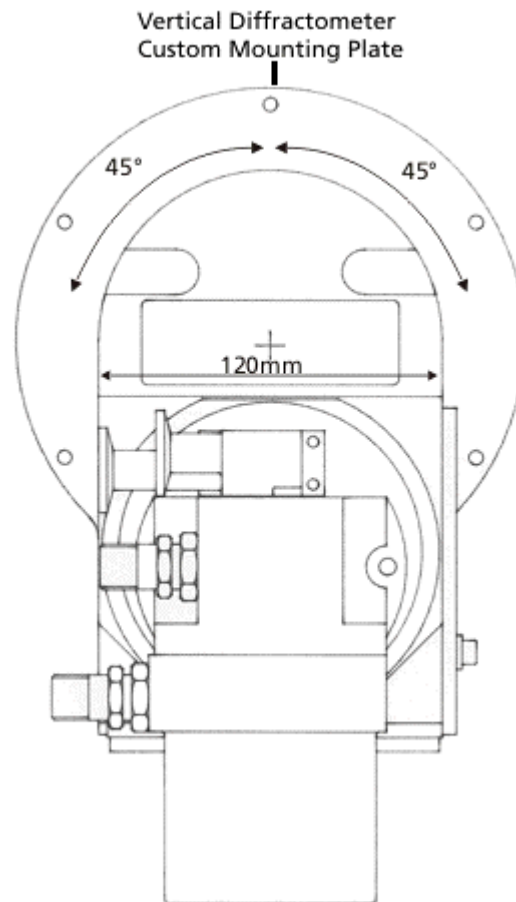
A standard application of this facility is fast cool down, achieved by running the Coldhead at boost speed. After reaching the desired temperature, the control system automatically switches to a lower speed for normal operation. If required, additional speed control can be achieved by the use of a simple dedicated user interface.

<b>Nominal cooling power at 20K (W)</b>	
Normal speed (50Hz) 60 r/min	2.0
Normal speed (60Hz) 72 r/min	2.1
Boost speed 90 r/min	2.4
Standby speed 45 r/min	1.1
<b>Nominal cooling power at 77K (W)</b>	
Normal speed (50Hz) 60 r/min	8.5
Normal speed (60Hz) 72 r/min	9.5
Boost speed 90 r/min	11.0
Standby speed 45 r/min	6.2
Crossover (mbar l at 20K)	220
<b>Time to cool down bare Coldhead (min)</b>	
- to 20K	<16
<b>Increase in cool down time for each</b>	
100g Added mass (min)	14
<b>Base temperature of Bare Coldhead (K)</b>	
Normal speed	9.0
Boost speed	8.5
Service intervals (hours)	>15,000
Weight (kg)	2.5

***Integrated PheniX Coldhead***

Base Temperature	~ 11K
Temperature Stability	< 0.1K
Coldhead weight	6 kg
Length of cryostat from the goniometer mounting plate	303mm
Angle of tilting of sample stage	±45°
Width of PheniX	120mm





### ***EXPB8 Combined Pumping Outfit***

#### **EXT70**

A turbomolecular pump (TMP) is a multi-stage axial-flow turbine in which high-speed rotating blades provide compression by increasing the probability of gas molecules moving in the pumping direction. The turbomolecular pump is optimised for molecular flow conditions and requires a suitably sized two-stage rotary vane pump (E2M1.5 incorporated) or an oil free scroll pump to exhaust to atmosphere.

#### **E2M1.5**

The E2M1.5 pump uses oil-filled rotary vane technology all rely on the same basic mechanism of a rotor shaft inside a stationary body, the stator. Into the rotor shaft are set a number of blades or vanes; these can slide in and out of the shaft. The rotation of the vanes sweeps gas through the pump.

EM Series pumps are rugged mechanical oil-sealed pumps with speeds ranging from .7 to 275 cubic metres per hour. Compact and quiet, they feature advanced lubrication circuits, high reliability, and accessories to suit specific application needs.

- The pump is designed for reliable, long-term operation in both laboratory and industrial environments.
- The pump is a free-standing unit.
- The drive is provided through a flexible coupling by a single-phase or three-phase (four pole) motor.
- The motors are totally enclosed and are cooled by the motor-cooling fan.

## Technical Data

Displacement (swept volume) 50 Hz	1 ft <sup>3</sup> min <sup>-1</sup> (1.8 m <sup>3</sup> h <sup>-1</sup> )
Displacement (swept volume) 60 Hz	1.3 ft <sup>3</sup> min <sup>-1</sup> (2.2 m <sup>3</sup> h <sup>-1</sup> )
Speed (Pneuop 6602) 50 Hz	0.9 ft <sup>3</sup> min <sup>-1</sup> (1.6 m <sup>3</sup> h <sup>-1</sup> )
Speed (Pneuop 6602) 60 Hz	1.2 ft <sup>3</sup> min <sup>-1</sup> (2.0 m <sup>3</sup> h <sup>-1</sup> )
Ultimate vacuum (total pressure)	
without gas ballast	1.1 × 10 <sup>-3</sup> torr (2.5 × 10 <sup>-3</sup> mbar)
with gas ballast	1.9 × 10 <sup>-2</sup> torr (2.5 × 10 <sup>-2</sup> mbar)
Inlet connection	NW10 flange
Outlet connection	
Nozzle	11 mm external diameter removable from hole tapped ? in BSP
Maximum permitted pressure at outlet	7 psig (0.5 bar gauge)
Maximum inlet pressure for water vapour	11 torr (15 mbar)
Maximum water vapour pumping rate	16 gh <sup>-1</sup>
Motor power	0.16 kW
Operating temperature range	12 - 40 °C
Weight, without oil	22 lbs (10 kg)
Noise	54dB(A)
Oil capacity – maximum	0.28 litre
Oil capacity – minimum	0.2 litres
Recommended oil	Ultragrade 15

The EXPB8 Combined Pumping Outfit is fitted with two analogue vacuum display gauges for the Ext70 and the E2M1.5.

## Installation Requirements

### PheniX Controller

Electrical	100-230 Vac 50-60 Hz 3 Amp
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### Edwards Turbomolecular Vacuum Pump Outfit

Electrical	100-230 Vac 50-60 Hz
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E&OE

	5 Amp
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### Cryodrive 3.0 Compressor

Electrical	Full load current in Amps at		
	Vac	50Hz	60Hz
	200	15.5	17
	220	14.0	16.4
	240	13.0	15.5
	Note: Cryodrive is configured to correct voltage on-site before use		
Cooling Water	Typical Flow Rate	5 litre/minute	
	Minimum Flow Rate	1.5 litre/minute	
	Maximum Flow Rate	7 litre/minute	
	Minimum Supply Pressure	2 bar	
	Maximum Supply Pressure	7 bar	
	Minimum Supply Temperature	4 C	
	Maximum Supply Temperature	26 C	
	Connections on Cryodrive accept ½” bore reinforced plastic hose.		
A suitable supply and return point and connectors need to be provided.			

Oxford Cryosystems reserves the right to change the specification of these systems at any time as part of our on-going development program.