

## Stirling Cryocoolers

**Honeywell Hymatic  
SAX101 series are  
'sealed for life' Stirling  
cycle cryocoolers**

AEROSPACE

The design uses Honeywell Hymatic's expertise in the manufacture of long life cryocoolers to realise a product that provides the potential for cost effective cryogenic cooling in large production volumes. This has been achieved by utilising advanced manufacturing techniques to simplify the assembly process, while maintaining extreme dimensional and alignment tolerances required by this type of long life device.

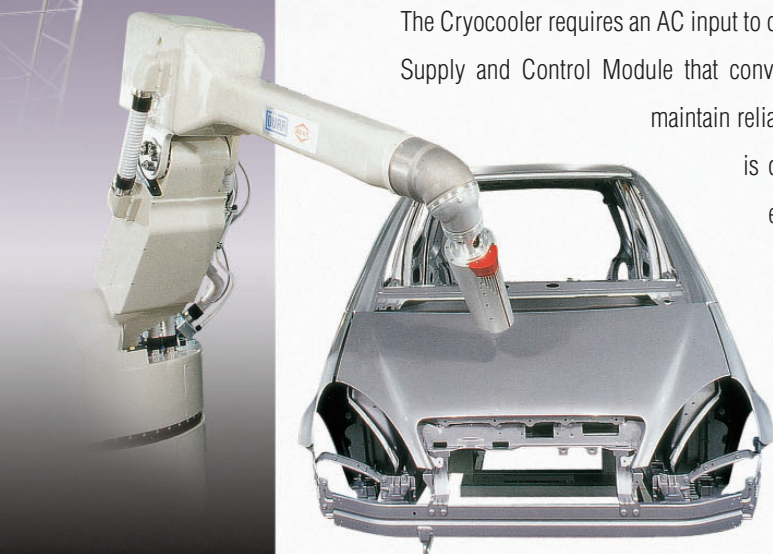
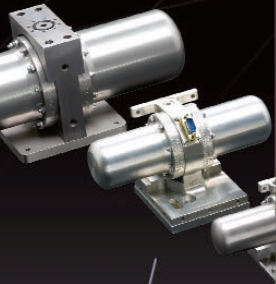
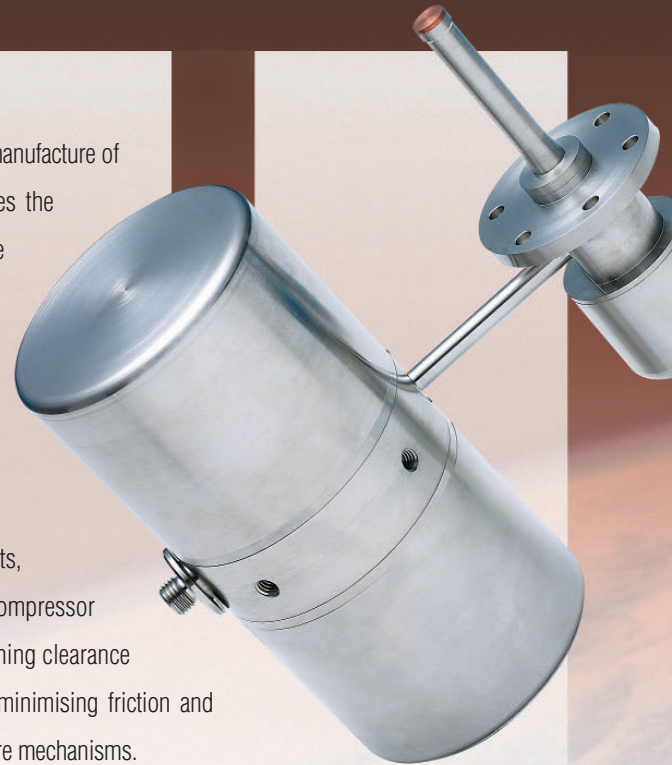
In common with all Honeywell Hymatic's Stirling products, the design utilises flexure bearings to suspend the compressor pistons and cold head displacer. This ensures that running clearance is preserved under all operational conditions, hence minimising friction and eliminating component wear and debris as potential failure mechanisms.

The Cryocooler consists of two dual opposed linear compressors mounted on a central block, which is designed to retain a high proportion of the compression heat. Surplus heat is removed via an external mounting fixture.

The Cold Head is manufactured separately and can be mounted directly onto the central block of the Compressor in any orientation or separately with an intermediate transfer tube.

The unit has a design life of 5 years continuous operation. This is based on the life testing of early experimental prototypes that have now exceeded 55,000 hours and many other examples in service.

The Cryocooler requires an AC input to drive the linear motors of the Compressor. This is supplied by a Power Supply and Control Module that converts a DC supply into an AC output of the required amplitude to maintain reliable operation during cooldown and steady rate running. This module is designed to achieve high levels of cold end temperature stability and ensures absolute temperature control over the life of the product. The control function is provided by a microprocessor that also allows control of the temperature set point.

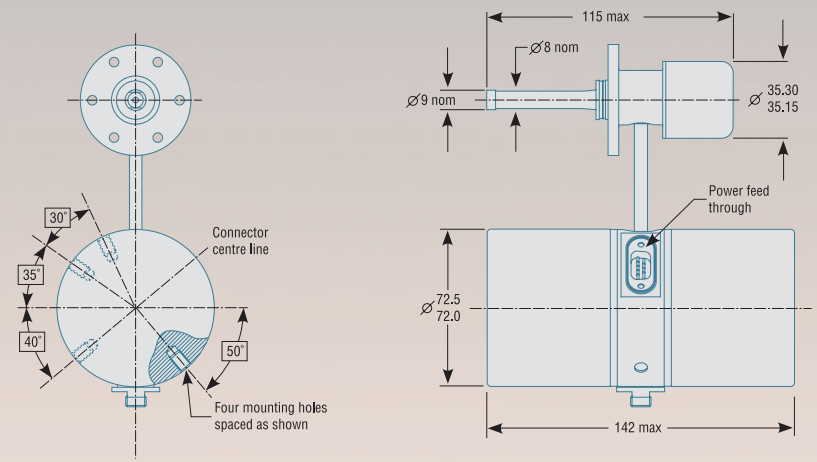


### Cryocooler Design

- Dual opposed pistons driven by linear motors to minimise exported vibration and acoustic noise
- Flexure bearing technology used in both compressor and cold head, eliminating wear and particulate contamination as a failure mechanism
- The flexure springs are designed and stressed for unlimited life
- Available in close coupled or split configurations
- 5 year maintenance free continuous operation (demonstrated). Expected life of beyond 10 years
- Constant efficiency and performance throughout its operational life
- Designed for rapid assembly, providing the potential for low cost with higher production volumes

### Power Supply and Control Modules

- High DC/AC conversion efficiency
- Selectable cold end temperature
- Designed to provide high levels of cold end temperature stability, constant over the life of the product
- Full military and telecommunications electro magnetic compatibility
- RS232 compatible system feedback



### Dimensions

Cryocooler with its Power Supply and Control Module shown in close-coupled configuration.

### Specification

- Power Supply – 40 watts (maximum) at 24V dc
- Environment – Worldwide conditions
- Operating life – 5 years continuous running (minimum)
- Heat Lift – See below

### Performance

The following graph shows the measured performance of a Cryocooler at normal and elevated ambient temperatures.

