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trust MMR Technologies....  
... the variable temperature solid state characterization experts!*

## WHAT EQUIPMENT DO I NEED TO PROVIDE FOR USE WITH AN MMR TECHNOLOGIES' JOULE THOMSON COOLING SYSTEM?

### THE JOULE THOMSON COOLING SYSTEM SETUP

There are many different experimental setups available from MMR Technologies' that use the Joule Thomson refrigerators. Despite these differences, each system is composed of the following:

- Heating and/or cooling stage
- Vacuum Chamber
- Gas Lines
- Regulator
- Gas Source
- Filter/Dryer
- Vacuum Pump
- Controller(s)
- Computer

### ITEMS REQUIRED BUT NOT SUPPLIED IN A TYPICAL SETUP

A typical set up from MMR Technologies includes the heating/cooling stage, vacuum chamber, gas lines, filter/dryer, and controller. There are several items which the user will need to provide. These are:

- a vacuum pump (TSB 007)
- a source of high pressure nitrogen gas (TSB 001)
- a high pressure regulator (TSB 005)
- a computer for software control of the system (TSB 011)

In an effort to keep equipment costs as low as possible, most MMR cooling systems are not priced to include the equipment listed above since such equipment may already be available in the laboratory of the user. For specific information on the requirements of the above four items, please refer to the technical support bulletins noted after each item. These can be downloaded from the MMR Technologies' website at [www.mmr-tech.com](http://www.mmr-tech.com).

It is assumed that most laboratories already have certain equipment which can be used with the cooling systems supplied by MMR Technologies to provide turnkey operation or to fully automate the operation of those systems.

With the exception of the high pressure nitrogen gas, all of the items discussed above can be obtained either from MMR Technologies or from local sources.

## **FURTHER RECOMMENDED ITEMS**

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There are a number of additional items that are recommended by MMR Technologies but that are not required for the operation of your system. These items include:

- Flowmeter (for accurate gas flow into the cooling system) - for more information see TSB 015
- Sample mounting kit - for more information see TSB 013

### **► NOTE**

*Because of the variety in experimental setups, there may be additional requirements for a specific system that are not mentioned in this technical support bulletin. To be certain that the system of interest has no additional requirements, contact MMR Technologies.*

## **FURTHER QUESTIONS**

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If you have further questions, please do not hesitate to contact MMR Technologies, Inc.:

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