

## Standard helium refrigerator LR1420/LR1620.



Linde continues the long tradition of dependable and affordable helium systems with production of the Model 1400-1600 series of helium systems. Capacities depend upon liquid nitrogen (LN<sub>2</sub>) pre-cooling and on the chosen size of compressor. All standard cold boxes are equipped with LN<sub>2</sub> pre-cooling capability, which provides a significant increase in capacity.

### Refrigeration capacity up to 900W at 20K

The 20K refrigeration process is based on a modified reversed Brayton cycle with two gas piston expanders. The system is controlled by a state-of-the-art PLC based control system. Significant system parameters are measured by digital instruments.

The LR1420 and LR1620 refrigerator are identical systems with different refrigeration capacities. Both refrigerator models are fully automated with dual 80K adsorber beds and mixing valves to control cooldown and warmup rates, and an internal heater to provide a false load.

The refrigeration operation is based on a constant helium flow rate from the chosen RS recycle compressor, which keeps the refrigerator cooling capacity constant. The operator simply inputs the helium supply temperature (or return temperature) set point (e.g. 20K) desired for the load. If the load temperature is constant or variable, the PLC will vary the wattage of the internal heater, changing the false load to balance out heat loads. This maintains the refrigerator cooling capacity constant.

### Piston expanders

The piston expanders have been improved over the years with better bearings and connecting rods. The load motor and alternator combination has been replaced with a single VFD motor. The resistor banks are reduced in size and mounted on the cold box cabinet. These improvements have significantly increased reliability.

**Standard scope of supply**

- The standard 20K helium refrigerator comprises:
- Vacuum insulated cold box, with female bayonet connections to/from the load
  - Finned tube and shell heat exchangers with LN<sub>2</sub> pre-cooling function
  - Two gas piston expanders
  - Recycle compressor with hermetically sealed motor, eliminating air contamination through a seal
  - Compressor oil removal system / gas management system
  - Water cooled, 15 gpm at 75°F max and 45 psig supply pressure (57 lpm at 24°C and 30kPA)

**Options**

- Pure helium gas buffer tank
- Cryogenic adsorber, external and portable
- Line drier
- Mating male bayonets
- Standard installation kit
- Transfer line systems
- Spare parts and maintenance kits
- Maintenance contract

**Standard control system supply**

- Data acquisition, remote monitoring and control system interface via remote computer
- PLC-based Main Operator Console
- 15-inch touch screen for process visualization with dynamic color graphic display

**Options**

- Trend recording
- Display of control loop status and process variables

**Technical specification  
LR1420/LR1620**

**LR1420 20K refrigeration guaranteed performance (watts)**

| 50 Hz                              | 60 Hz                              | 50 Hz                           | 60 Hz                           |            |
|------------------------------------|------------------------------------|---------------------------------|---------------------------------|------------|
| Without LN <sub>2</sub> precooling | Without LN <sub>2</sub> precooling | With LN <sub>2</sub> precooling | With LN <sub>2</sub> precooling | Compressor |
| 132                                | 160                                | 217                             | 271                             | RSS        |
| 225                                | 225                                | 465                             | 560                             | RS         |
| -                                  | -                                  | 560                             | -                               | RSX        |

**LR1620 20K refrigeration guaranteed performance (watts)**

| 50 Hz                              | 60 Hz                              | 50 Hz                           | 60 Hz                           |            |
|------------------------------------|------------------------------------|---------------------------------|---------------------------------|------------|
| Without LN <sub>2</sub> precooling | Without LN <sub>2</sub> precooling | With LN <sub>2</sub> precooling | With LN <sub>2</sub> precooling | Compressor |
| -                                  | -                                  | -                               | -                               | RSS        |
| 300                                | 360                                | 595                             | 715                             | RS         |
| 360                                | 390                                | 715                             | 850                             | RSX        |
| 390                                | 390                                | 900                             | 900                             | 2RS        |

**LR1420/LR1620 main dimensions**

| Description                      | L x W x H [m]         | Weight [kg] |
|----------------------------------|-----------------------|-------------|
| Model LR1420 Helium Refrigerator | 1.270 x 1.067 x 1.700 | 818         |
| Model LR1620 Helium Refrigerator | 1.476 x 1.274 x 1.803 | 953         |
| Compressor - RSS                 | 1.450 x 1.250 x 1.420 | 1100        |
| Compressor - RS & RSX            | 1.450 x 1.350 x 1.480 | 1135        |

**Linde Cryogenics**

A Division of Linde Engineering North America Inc.  
6100 South Yale Avenue, Suite 1200  
Tulsa, Oklahoma 74136, USA  
Phone +1.918.477-1200  
www.leamericas.com, sales@leamericas.com

**Linde Kryotechnik AG**

Daettlikonerstrasse 5, 8422 Pfungen, Switzerland  
Phone +41.52.304-0555, Fax +41.52.304-0550  
www.linde-kryotechnik.ch  
info@linde-kryotechnik.ch

Linde Cryogenics reserves the right to change the specifications without prior notice, especially to make revisions regarding design and technology which improve the functionality; errors in description and illustration excepted.