

# Standard Helium Liquefier/ Refrigerator L 140/LR140

Linde Kryotechnik AG

Linde

## Liquefaction capacity: up to 140l/h at 4.4 K Refrigeration capacity: up to 400 W at 4.4 K

The newly developed, fully automatic computer controlled L-Series offers a wide range of liquefaction and refrigeration capacities, depending upon liquid nitrogen (LN<sub>2</sub>) pre-cooling and on the chosen size of compressor. All standard cold boxes are equipped with a LN<sub>2</sub> pre-cooling facility, which allows a significant increase in capacity. The L140/LR140 therefore provides a high degree of flexibility to meet your requirements today and in the future.

The liquefaction and refrigeration process is based upon a Claude cycle with dynamically balanced gas bearing turbo expanders. The new TED turbines are based on our proven TGL turbine technology and have been developed further to ensure maximum efficiency and reliability.

A purifier is integrated in the cold box to enable the liquefier to accept recovered helium contaminated with up to 10% of air impurities. Initial purification down to 1% impurity level is achieved by air condensation, the remaining air is then frozen out. Regeneration of the freeze out purifier is fully automatic. The cooling for the purification is generated by the helium cycle, so no external cryogenes are required.

The LR140 refrigerator is based on the L140 design using the same standard components and offering the same features. Differences are only marginal for example the purifier is not required and the control system is dedicated to the operational needs.

### TED Turbo Expander

The enhanced Linde TED gas bearing turbo expander is a small, single-stage centripetal turbine, braked by a direct coupled single-stage centrifugal compressor. The turbine uses dynamic gas bearings operating at ambient temperature. The TED turbo expander is even more reliable in operation and requires no scheduled maintenance due to special design features.

### Standard Scope of Supply

The standard helium liquefier/refrigerator comprises of:

- Vacuum insulated cold box, either with integrated automatic purifier (L140) or transfer line connection to/from the cryostat (LR140)
- Control cabinet with operator panel, removable from the cold box
- Aluminium plate-fin heat exchangers with LN<sub>2</sub> pre-cooling facility
- Two TED turbo expanders with dynamic gas bearing
- Oil injected recycle compressor, air or water cooled
- Oil removal system / gas management panel
- Coaxial transfer line from liquefier to dewar (only L140)

### Options

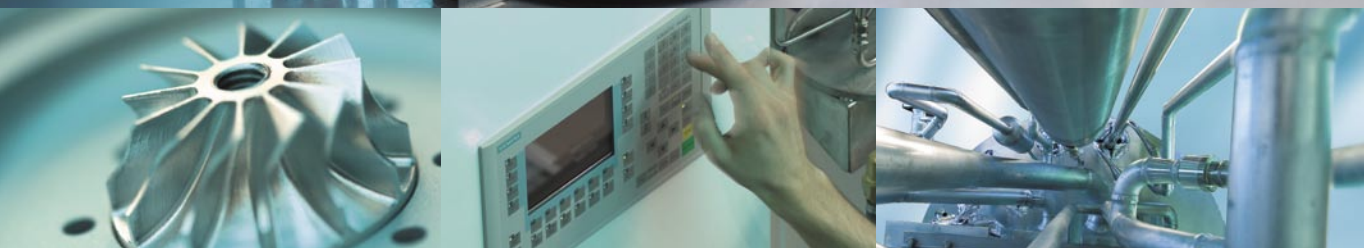
- Pure helium gas buffer
- Line drier
- LHe storage dewar and decant line
- Standard installation kit
- Recovery system
- Spare parts
- Maintenance contract

### Standard Control System Supply

- Siemens S7-300
- OP270 operator panel with function keys and text display
- Control cabinet, removable from the cold box, communicating via Profibus

### Options

- Remote Monitoring and Control System (RMCS) on personal computer
- Process visualization with dynamic colour graphic display
- Trend recording
- Display of control loop status and process variables



### L140 Liquefaction Performance at $\leq 4.4$ K

without LN <sub>2</sub> pre-cooling	with LN <sub>2</sub> pre-cooling	Compressor/Power rating
45 l/h	90 l/h	DSD171/90 kW
60 l/h	120 l/h	DSD201/110 kW
70 l/h	140 l/h	DSD241/132 kW

### LR140 Refrigeration Performance at $\leq 4.4$ K

without LN <sub>2</sub> pre-cooling	with LN <sub>2</sub> pre-cooling	Compressor/Power rating
210 Watt	255 Watt	DSD171/90 kW
250 Watt	325 Watt	DSD201/110 kW
290 Watt	400 Watt	DSD241/132 kW

### L140/LR140 Main Dimensions

Description	L x W x H [m]	Weight [kg]
Cold box	1.6 x 1.3 x 2.6	1700
Control cabinet	0.8 x 0.4 x 1.9	110
Compressor DSD type	2.3 x 2.0 x 1.9	3400
Oil removal system & Gas management panel	0.9 x 1.2 x 2.6	500 (including filling)

Linde Kryotechnik 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.



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