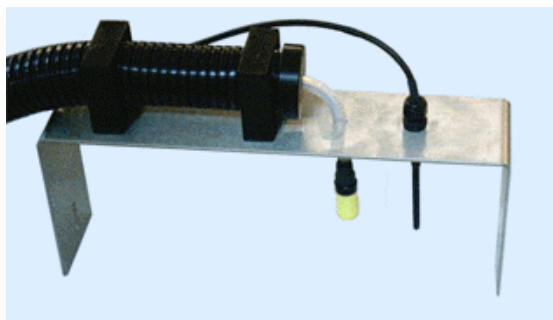


## NORHOF LN2 DSC autofill System model 606

Fully automatic slow filling system for Shimadzu Differential Scanning Calorimeters.

Are you still poring LN2 into your DSC by hand, several times per measurement?

- Safe auto filling of DSC.
- The operator can not come in contact with the LN2
- System fills up to 4 cm level in the DSC reservoir, and then very slowly keeps filling while measurement runs
- Steered by the DSC, filling stops when cold is not any longer needed.
- Pressure-less flowing LN2, without spilling, noise, vibrations etc.



Adaptor for Shimadzu DSC60 and similar

picture shows pump, mounted on a 35 Liter dewar.

total system height 79 cm

possible dewars are 25, 35 or 50 Liter



Norhof manufactures cooling systems in which Liquid Nitrogen (LN2) is used as the cooling medium. LN2 is supplied without any pressure and filling an application is like a teapot filling a teacup. You may compare our liquid nitrogen dispenser system with a water tap, but instead of giving water, it gives LN2, starting with some drops, up to 1 Liter/minute.

The reservoir dewar can safely stand next to your working place. No dangerous LN2 pressures exits. When your DSC needs cold, the system is switched on by the Shimadzu DSC, starting to supply LN2. (\* for other DSC's pump may be switched by 5 Volt signals or RS232 commands, or by the button on the pump)

When switched ON, the system starts building a small over pressure, forcing the liquid gently to rise into the fill line, and fall into your dry DSC reservoir. The sensor, placed also in the reservoir, makes the

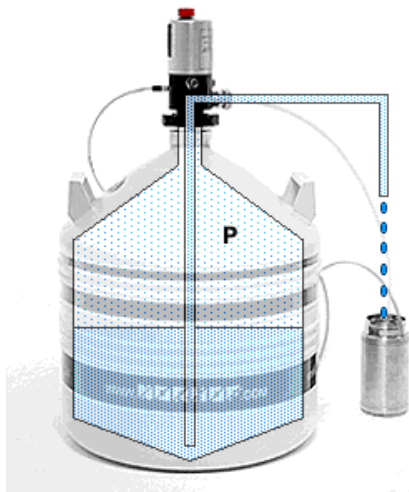
filling slower when there is ab.4 cm level. If the level becomes lower, filling is increased. If the level becomes too high, filling is slower, thus keeping the level continuous on 4 cm.

The majority of this system finds use in the field of scientific instruments, physical laboratories, research centers etc. where DSC measurements are made with a DSC which needs LN2 during the measurement process.

Use of this system is for example for:

- auto filling of Shimadzu DSC60 or similar with the adaptor shown on picture above
- auto filling of other brands of DSC, with an adaptor on request

### Working principle



The pressure above the liquid level inside the dewar is built by heating a small amount of liquid in the bottom of the dewar.

With only up to 50 mBar of overpressure, the liquid will gently rise out of the rise pipe and fall into the fill hose.

Because we evaporate some LN2 to build pressure, there is no adding of ice inside the dewar, such as with manual systems which use air from the environment.

In the Norhof LN2 cooling systems, Liquid Nitrogen is stored in pressure less Dewars. When LN2 is required, a small overpressure is generated by a small heater element in the LN2, and liquid flows out of the system like water from a tap, without spilling, noise, vibrations etc.

\* For other applications where automatic LN2 administration is needed, we have the #900 serie of microdosing pumps, see the website

The advantages are numerous:

- **the system is extremely safe,** the operator comes not in contact with LN2.
- **the system is time saving,** the operator does not need to pour in LN2 several times.
- **the system can autofill the DSC just with a press on the start button**  
this means that the system is ready for use 24 hours a day.
- **the system delivers LN2 without any pressure,** this means without noise, vibration, excessive waste, etc.
- **there is no external LN2 valve used,** that implies no unnecessary heat input, which spoils a lot of LN2
- **there is no internal LN2 valve in the pump**  
LN2 comes out of insulated tubing without making contact to warm metallic parts, so very fast
- **there is a very low thermal masse to cool down in the pump**  
Filling efficiency is better than 90%, due to very less loss for cooling down pump parts.
- **there is a very low thermal connection to the ambient temperature**  
This means that the system is extremely economic in stand-by. Typical usage less than 0,5 Liter / day
- **P.E.D. 99/36/EC (Pressure European Directive) for pressurized vessels does not apply for this system**  
The maximum possible pressure is lower than 300mBar. Therefore this system is allowed to be used inside the lab, near your working place, without danger.

### Technical Specifications

Static evaporation rate	< 0,5 liters per day		
Filling flow rate	Dripping up to 0.1 Liter/minute, depending on application level		
Maximum working pressure	< 300 mBar		
Power connection	115V / 230V AC with supplied power supply or 12 Volt AC/DC		
Power consumption	average 10 Watts, during pumping 50 watts		
Storage container volume	25 Liter(on request)	35 Liter (standard)	50 Liter
Outside dimensions (round)	395	480	500 mm
Height dimensions	736	643	727 mm
Weight (empty, full)	10 / 31	13 / 41,5	17 / 51,5 kg
System includes	Monitor software, to monitor pump behavior, to preset filling height and flow rate.		
External steering	5 volt signals for ON, OFF, RS232 signals for ON, OFF.		
Alarms/warning acoustical/ visual / mechanical	Dewar empty, 5 liters left, broken sensor, overpressure protection		
Options	Adaptor for Shimadzu DSC60 or similar Transport trolley 5 wheels (12 cm height) Stand for pump (when dewar is refilled)		