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Operating Instructions

Level controlling device for liquid nitrogen

LEVEL CONTROL LN2

1. Unpacking and Setting Up

Please unpack the appliance carefully and look for damages. It is important that eventual transport damages are already recognised upon unpacking. If needed an immediate factual statement will be required. Contact the manufacturer for this purpose.

Look up the admissible environmental conditions from the technical data.
Please verify before putting into operation, whether your mains supply tension is 230 V ~ 50 Hz or 115 V ~ 60Hz.
Use only approved temperature probes and LN2 solenoid-controlled valves (electro valves)

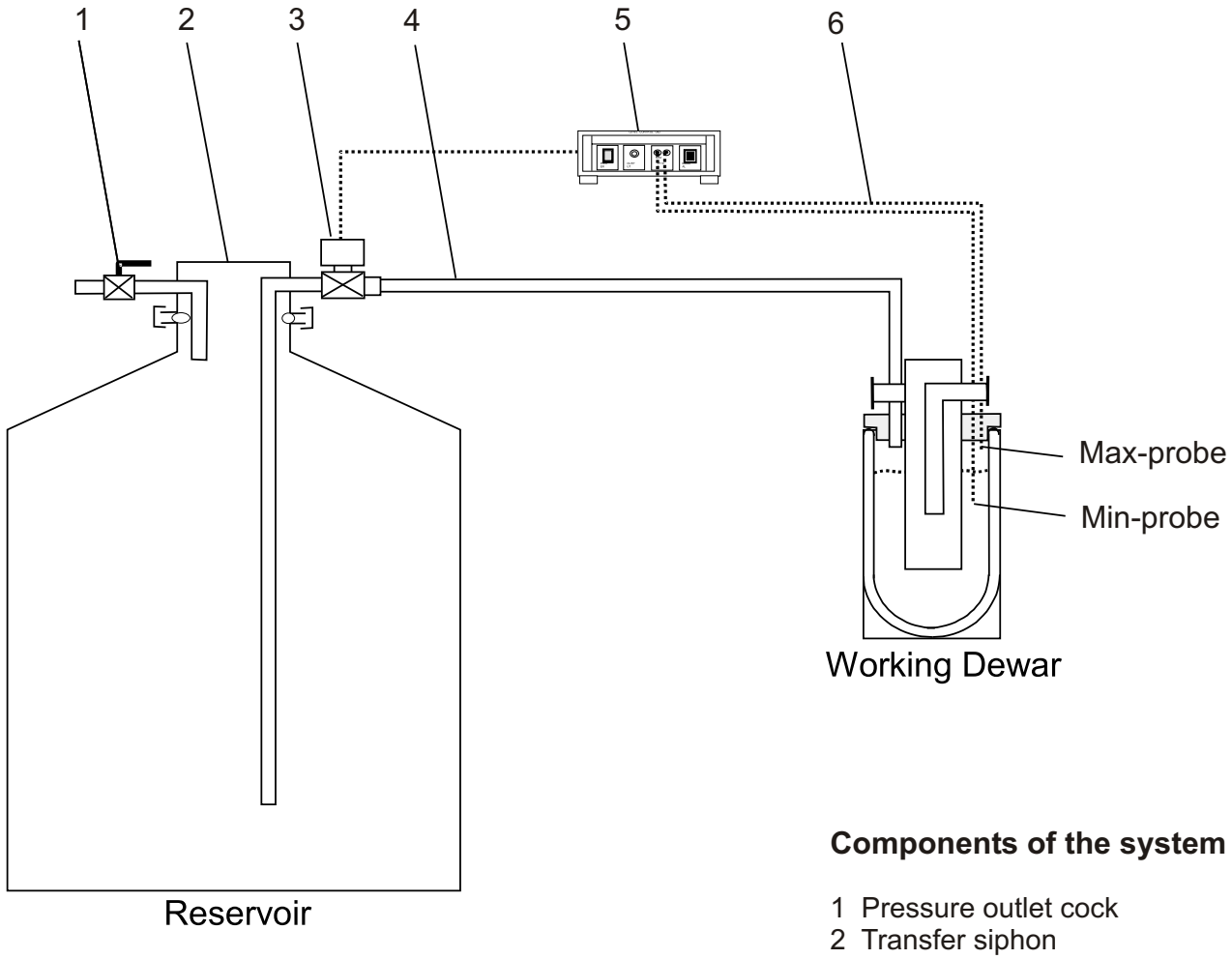
2. Mounting and Commissioning

When mounting the system please keep the following order of procedure:

IMPORTANT !! Wear protective glasses and protective gloves !!

1. Set siphon with electro valve onto the reservoir filled with liquid nitrogen.
2. Fix siphon with straining ring and close the off-gas valve.
3. Wait for a while until a working pressure has built up in the reservoir due to the self-vaporisation of the liquid nitrogen. Please always pay attention that the pressure inside of the reservoir does not surpasses 0.5 bar, attach an overpressure valve, if needed.
4. Establish the electrical connection between the electro valve and the controlling unit (OUTPUT 24V ~ diode bushing on rear side of the instrument).
5. Connect probes for minimum and maximum (jack plug) to the controlling unit and fix the probes in the working Dewar vessel to the desired filling height. The working Dewar vessel must be without pressure.
   Please pay attention that the probes neither touch the walls nor other component parts, as this can lead to failing functions of the controlling unit because of thermal conduction of the wall materials.
6. Insert mains plug of the controlling unit and switch it on.

2.1 Sketch of the mounting structure



Components of the system

1 Pressure outlet cock
2 Transfer siphon
3 LN2 electro valve
4 Transfer hose
5 Controlling unit
6 Min - Max. Probe PT 100

3. Function

The controlling unit can be utilised in two regulation operating modes:

3.1 Dual-mode Control

The maximum probe is fixed above the minimum probe.

If the liquid nitrogen level is under the minimum probe, the regulator will open the electro valve. Due to the pressure built up by self-evaporation in the reservoir, liquid nitrogen will continue flowing into the working Dewar, until the liquid nitrogen level will be above the maximum probe, and the controlling unit will close the electro valve.

If the level sinks under the minimum probe the cycle will start again.

3.2 Mono-mode Operation

The maximum probe is fixed under the minimum probe.

The regulation is effected around the maximum probe. The minimum probe is insignificant; because of the automatic cable break safety device it must, however, also be inserted, or a dummy plug must be used for the minimum probe.

If the liquid nitrogen level is under the maximum probe, liquid nitrogen will continue flowing into the working Dewar, until the liquid nitrogen level will be above the maximum probe, and the controlling unit will close the electro valve again. The procedure of opening and closing is done with a time lag. We recommend to use the instrument in dual mode operation, if possible.

3.3 Manual Refilling

The working Dewar can be refilled also manually at any time by means of the flip switch.

As long as the flip switch is pressed, the regulator opens the electro valve and liquid nitrogen flows into the working Dewar.

3.4 Optical Indication of the Refill Procedure

The refill procedure is indicated on the front plate of the controlling unit.

The applied electro valve is self-closing for safety reasons, i.e. the valve stays closed in a tensionless case.

As long as the electro valve output is under tension and the electro valve is opened, the indicator lamp "OUTPUT" will be illuminated red.

3.5 Automatic Cable Break Safety Device

The unit has an automatic probe cable break safety device.

In the following cases the instrument will release an alarm optically (red blinking light) and acoustically (whistle sound):

1. Probe plug is not inserted orderly.
2. Probe line is defective.
3. PT 100 probe is defective.

4. Maintenance and Cleaning

The instrument is maintenance-free. In a case of repair it may only be opened by an electronics expert. Please send the unit to the manufacturer for repair.
The unit must only be cleaned with water and a tenside detergent additive. Use a damp cloth hereto and pay attention that no water will penetrate into the interior of the unit.

5. Error Analysis

The unit generally works without failure. If disturbances occur, please look for faults according to the following method.

Faults Found	Possible Causes	Remedy of Faults
Green lamp is not illuminated upon switch-on (No tension supplied)	- Mains socket without tension supply - Mains plug not inserted	- Establish mains tension - Insert mains plug
Whistling tone sounds upon switch-on (Cable rupture device)	- Probe plug not orderly inserted - Probe line is defective - PT 100 probe is defective	- Insert probe plug - Check probe resistance, if necessary contact manufacturer (resistance of the probes at 20°C about 110 Ohm Measuring points see plug assignment)
Electro valve does not switch	- Green lamp (power) is not illuminated - Instrument is not switched on - Probe touches wall or other component parts - Working Dewar is not pressure less - Electro valve defective	- See above - Switch appliance on (power) - Fix probe in a way in which it won't touch a wall. - Change working Dewar - Check tension OUTPUT, if necessary contact manufacturer (With hand switch pressed: tension on Electro valve output: about 24 V alternating tension)

If none of the mentioned measures is successful, please contact the manufacturer.

6. Available Accessories

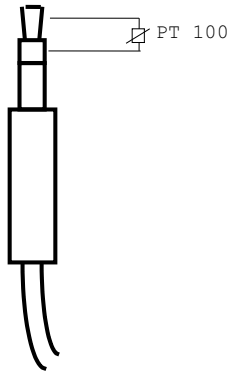
	Art. No.
- Temperature probe PT 100	1302
- Dummy plug	1302 B
- Electro valve for liquid nitrogen (24V ~ , 50 Hz)	1303
- Liquid nitrogen transfer siphon with electro valve for reservoir with safety fittings	1304
- Liquid nitrogen transfer siphon with electro valve for reservoir without safety fittings	1305

- Liquid nitrogen reservoir of aluminium or stainless steel (on request, please ask for catalogue)

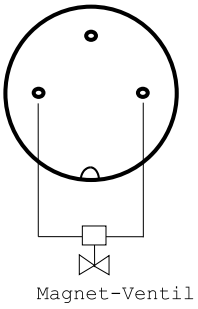
- Working Dewar vessels of glass or stainless steel (on request, please ask for catalogue)

7. Plug Assignment

Temperature probe
Jack plug



Electro valve
Three-pole diode plug



8. Front and Rear Side

1 Mains switch with green Illuminous indicator

2 Electro valve function indicator, Alarm indicator (blinking light)

3 Minimum probe bushing

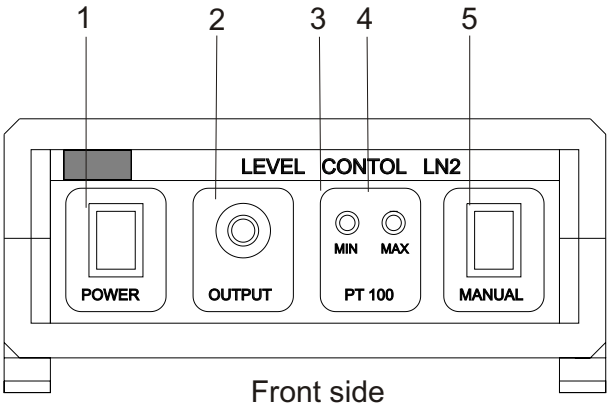
4 Maximum probe bushing

5 Flip switch for manual filling

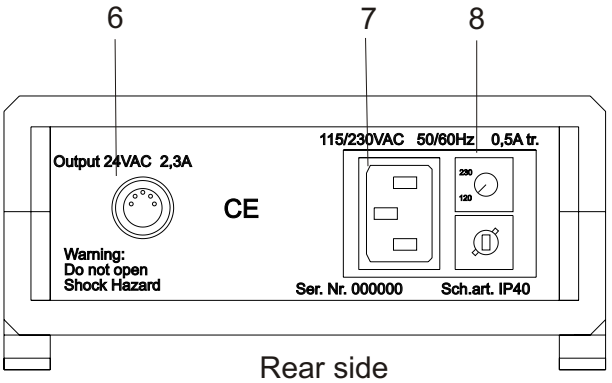
6 Electro valve connection

7 Mains supply

8 Protective fuse



Front side



Rear side

9. Technical Characteristics

9.1 Controlling device

Dimensions w x h x d	: 160 x 75 x 200 mm		
Weight	: 2,5 kg		
Mains tension	: 230V ~ 50 Hz or 115V ~ 60Hz.		
Protective fuse	: 0.5 A time-lag fuse		
Connections	: front side	- min probe	(jack bush)
		- max probe	(jack bush)
	: rear side	- electro valve	(diode bush)
	24 V ~ , 2.3 A		
Protection type	: IP 40		
Environmental conditions	: 10° to 30°C, max 80% rel. humidity		
Mark of conformity	: CE		

9.2 Minimum, Maximum Probe

Minimum-probe yellow marked

Type	: PT 100
Class	: B
Resistance at 20°C	: about 110 Ohm
Connection	: 3.5 mm jack plug

9.3 Electro valve (accessory)

Tension supply	: 24V ~ 50 Hz; 17 Watt
Function	: self-closing
Medium	: approved for liquid nitrogen
Connection	: diode bushing 3-pole

10. Guarantee

With proper handling we grant a guarantee of 12 months. The guarantee comprises at maximum the purchase value of the unit. In a case of guarantee please contact the manufacturer.