

**Operation Manual
Level Sensor
DC-LS-50**

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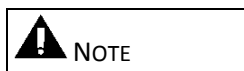
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I. STRUCTURE OF THE MANUAL / CLARIFICATION

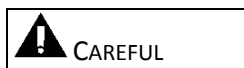
The various aspects of this manual are clearly listed here. Points of attention are marked throughout the entire manual in the following way (the interpretation is also given):



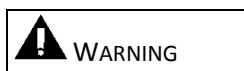
Offers suggestions/advice to the operator in order to perform certain tasks more easily.



Points out possible problems to the operator.



Indicates damage to the system or directly linked equipment when the operator does not carefully adhere to the procedures.



Warns the operator of possible injuries if the procedures are not adhered to properly.



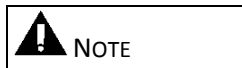
The life of the operator is directly threatened.

**Demaco Holland bv considers the operator to be:
the one who operates the machine or equipment supplied by Demaco Holland bv.**



The operator is responsible for the safety of any assisting employee. The operator must ensure, before starting the machine or application, that no dangerous situation can occur for the assisting employee.

II. SAFETY AND HEALTH CONCERNS



This user manual must be read by the operator as soon as possible in order for him to become familiar with the operation of this equipment.

From the point of view of injuries to the operator, specific attention is given to the dangers that can occur when using liquid nitrogen. On Demaco Holland bv equipment, where the operator may come into contact with liquid nitrogen, you can find the label as shown below. It warns the operator of the presence of coldness and it is indicated that safety glasses and gloves with wrist protection should be worn.



figure 1; *Safety label on Demaco Holland bv products*

This user manual should at least be available for consultation at the head of the department. We recommend that a copy be made of this manual inserted in plastic folders, or bound, and put on view at location with the control cabinet.

We also recommend to carefully read the Demaco safety instruction “Safety guidelines for working with cold media”. Extensive information is provided in this manual about working with cryogenic media. A copy of the “safety instruction” is shipped with this delivery. Should you require more copies of this instruction in order to create a safe working environment for your operator(s), additional copies can be requested from Demaco Holland bv. Contact our sales department.

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1 INTRODUCTION

1.1 Use of the DC-LS-50 Level Sensor

The DC-LS-50 Level Sensor is a very robust Level Gauge suited for cold stored liquefied gases like nitrogen, oxygen, argon, carbon dioxide and nitrous oxide. It provides an easy to mount, accurate and reliable digital liquid level indicator.

The capacitance of the full stainless steel sensor increases ratio metrically with the liquid coverage and is converted into an easy to read, digital read out with 0.1% resolution. Additionally it has standard an analogue 4-20mA loop connection to be used for industrial control or remote purposes. As the unit is battery powered there's no need for any additional power or cabling. By using the 4-20mA loop the life indicator flashes and the battery is just needed to power the digital read out when required. By pressing the front key the unit measures and shows the actual level during 10s and switches off automatically afterwards.

To mount the Gauge on a tank, a few commonly used fittings are available, the probe diameter is 12mm. Please provide exact (internal) tank size and fitting dimensions when ordering.

Three push buttons are provided for an easy and clear access to electronically stored settings.

1.2 Assembly location

For safe operation of the DC-LS-50 Level sensor the following points must be taken into consideration:

- Easy to access.
- Easy to read (not in direct sunlight).
- Adequate space to operate and maintain.
- Not exposed to vibrations and shocks.

1.3 Project number

The project number sticker has been affixed on the back of the housing, which specifies the project number.

P 120035-01

1.4 Front panel with loop indicator and front key



figure 2; *Front panel.*

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2 TECHNICAL DETAILS

2.1 Sensor

- Material stainless steel 304 / 316
- Diameter 12mm
- Length according to tank size
- Temperature -200°C ... +100°C
- Maximum Pressure 35 bar

2.2 Display

- Supply 9V PP3-battery (6LR61) or 4/20mA-Loop powered
- Battery life 3-5 years* at 3 times/day with an alkaline battery (500mAh)
- Read out 3-digit high efficiency red LED 15mm characters
- Resolution 0.1%
- Reproducibility 1%
- Measuring rate ca. 1/s
- Temperature -40°C ... +60°C
- Dimensions ca. 100 x 65 x 40 mm
- Material Polycarbonate
- Ingress Protection IP65

* actual battery life depends on storage and operating temperature, time intervals, manufacturer, etc.

2.2.1 Status Indication

- Low battery voltage < 6.5V
- Underload level < 0%
- Measuring range level 0-100%
- Overload level > 105%

Display

- *[bAt]* during 2 seconds preceding level indication
- *[uL]*
- *[0.0]-[100]*
- *[105]-[900]*

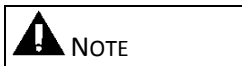
2.3 Remote connection

- Type 2-wire 4/20mA current loop
- Voltage 8... 30Vdc
- Accuracy 0.5% (0.08mA)

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3 START UP

- Check the size of both sensor and tank to ensure they match.
- Try to avoid the presence of any (humid) air near cold surfaces. Any condensation of especially water inside the sensor tube will strongly increase the identification or even change to an overload situation [oL].
- Position the sensor at the correct height and orientation and fix the sensor by tightening the fitting. Ensure the breathing hole of the sensor is always underneath the fitting.
- Pressurize the tank and check for eventual leakages.
- Connect the level sensor cable to the level sensor.
- Fill up the tank to full and check the indicator value to be about 100%.



4 ADJUSTMENTS

Underneath advanced adjustments are just for experienced users and may just be done in close cooperation with the manufacturer.

4.1 Adjusting the level indicator (Empty 0% and Full 100%)

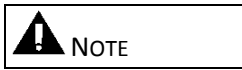
Empty and Full are adjusted independently.

By leaving it for 5 seconds, the unit switches off automatically without changing stored data.



figure 3; *Level indicator without front cover.*

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Changing of below adjustments is only enabled by placing the jumper at lowest position!

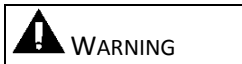
4.2 Empty at 0%

- Remove cover
- Push ENTER-button (middle) => [0.0]
- Push MINUS-button (left) => [CAL]
- Push MINUS-button (left) => [Lo.]
- Push ENTER- button (middle) => [0.0]

4.3 Full at 100%

- Push ENTER-button (middle) => [0.0]
- Push PLUS-button (right) => [CAL]
- Push PLUS-button (right) => [Hi.]
- Push ENTER- button (middle) => [100]
- Replace cover.

5 MAINTENANCE



During some parts of this maintenance check the system must be operational. Therefore all safety requirements noted in this manual must be met.

Fully check the system at least once every six months by operating the equipment and checking the following:

1. Activate display and check battery status.
2. Check all electrical connections. Connections that show signs of chafing, bare wires or other signs of wear must be replaced.
3. Report and repair any malfunction.
4. Clean the DC-LS-50 Level sensor housing periodically using a cloth.