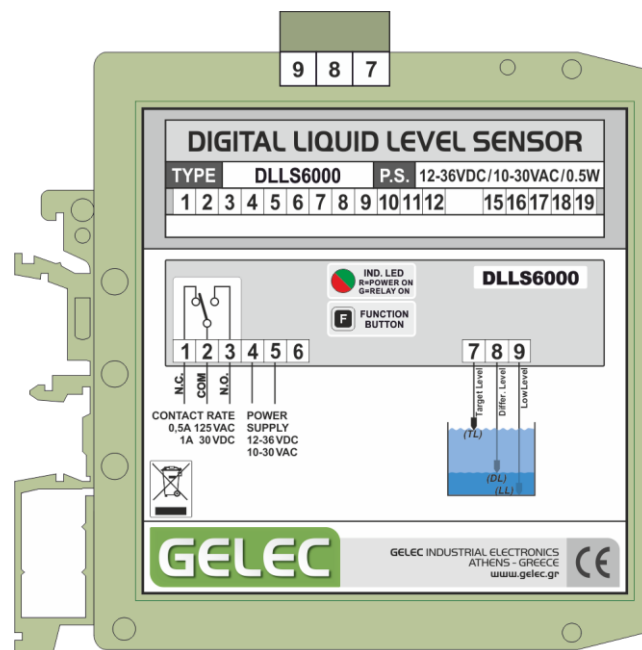


# DIGITAL LIQUID LEVEL SENSOR DLLS6000



INDUSTRIAL ELECTRONICS



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## PRECAUTIONS!

There are no serviceable parts inside the **DLLS6000** unit. Not to be opened by any unauthorized person. All repairs to the device must be carried out by the manufacturer.

**Improper handling may result in serious personal injury and considerable material damage.** All connection and maintenance work must be carried out by qualified personnel.



### **RISK OF ELECTRIC SHOCK!**

**Use the correct voltage.** The DLLS6000 is designed for use with specific voltage only. Connection to a different voltage may cause fire, electric shock or other damage.

**Do not touch the plug and the connectors with wet hands.**

**Disconnect the DLLS6000 before cleaning it,** to avoid the risk of electric shock.

**Attempting to use a malfunctioning DLLS6000 can be dangerous.**

**Do not block the ventilation slots on the cabinet of the DLLS6000.**

**Keep liquids away from the DLLS6000.**

Spillage into the cabinet may result to fire, electric shock, or equipment damage. If a small object or liquid falls/spills into the DLLS6000 cabinet, unplug the unit immediately. Have the unit checked by a qualified service engineer before using it again.

**Set the DLLS6000 in an appropriate location.**

Do not install in a dusty, humid, or vibrating environment. Do not place it near heater, or air conditioner. Keep it away from air, steam, extremely high or low temperature or humidity.

## **I. MANUFACTURER'S WARRANTY, GENERAL TERMS AND CONDITIONS**

Thank you for purchasing our product.

Our products have been manufactured with the latest technology, the highest quality components and have gone through rigorous quality control tests at the factory, before shipment. Make sure that the part number and type indicated in the identification label and pack correspond to the part number or type of your order. After receiving, inspect the unit to ensure that no damage have been caused during transportation.

GELEC and GELEC's authorized distributors warrant to the original purchaser that the product shall be free from defect in material and/or workmanship. The warranty period begins on the purchase date (proof of purchase by invoice or delivery note) and is valid for one (1) year. The guarantee period begins on the sales date (proof of purchase by invoice or delivery note) and is valid for 1 year.

In the event of malfunction during the warranty period attributable directly to faulty material and/or faulty construction and functional defects, GELEC and authorized distributors will, at their option, either repair or replace the faulty product with the same or similar model.

GELEC and authorized distributors shall have no obligation under this warranty, however, in the following cases:

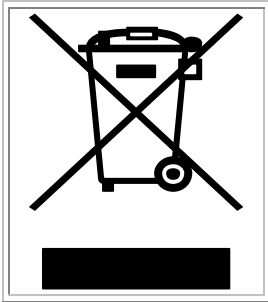
- Any defect caused by freight damage, accident, disaster, faulty maintenance or improper handling.
- Any defect caused by modification, alteration, abuse, misuse or incorrect installation.
- Any defect of the product caused by improper repair by third party other than GELEC and GELEC's authorized distributors.
- Any incompatibility of the products with subsequent technical innovations or regulations.
- Any defect of the product caused by external equipment.
- Any defect of the product on which the original manufacturer's labeling has been altered or removed.

In case of complaint please contact our company or send the unit un-dismantled to your local dealer. Any necessary replacement parts and necessary repair work are totally covered free of charge.

All products are designed and produced by the manufacturer GELEC Co. Ltd to be in compliance with the EU norms applying to them. GELEC is not responsible for direct or indirect damages or malfunction caused by improper use or installation of the DLLS6000.

## 2. DISPOSAL OF OLD ELECTRICAL & ELECTRONIC EQUIPMENT

*- Applicable through the EU and other European countries with separate collection programs -*



This symbol, found on your product, indicates that this should not be treated as household waste when you wish to dispose it.

**It should be handed over to an applicable collection point for the recycling of electrical and electronic equipment.**

By ensuring this product is disposed of correctly, you will prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product.

The recycling of materials will help to preserve natural resources.

### 3. DIGITAL LIQUID LEVEL SENSOR **DLLS6000**

This operator's manual explains the functions and operation of the **DLLS6000**. It also gives some troubleshooting tips as well as general precautions to be taken when operating the unit. In order to ensure the best performance and effective use of the DLLS6000, we recommend that you read the information in this manual carefully and follow the instructions contained.

This manual is a complete guide to the DLLS6000 with information on unit user maintenance, unit installation and instructions on how to operate it. Do not touch any part of the DLLS6000 the manual does not cover. Keep the manual for immediate reference. It should help in solving any operational questions you may have.

No part of this manual may be quoted, reproduced, stored in a retrieval system, transmitted, transcribed or translated into any other language in any form or by any means, electronic, mechanical, or otherwise, without prior written permission of **"Gelec Co. LP"**.

Although every effort has been made to ensure that this manual provides up to date information, please note that the contents in this manual and the unit specifications are subject to change without notice.

DIGITAL LIQUID LEVEL SENSOR																		
TYPE		DLLS6000								P.S.		12-36VDC/10-30VAC/0.5W						
1	2	3	4	5	6	7	8	9	10	11	12					15	16	17
																18	19	

Do not forget to refer the exact type and version of your DLLS6000 whenever you contact the manufacturer, asking for any further information. You can find this information on the identification label on the side of the unit.

## 4. GENERAL DESCRIPTION

The DLLS6000 is a programmed device used for liquid level control in open tanks and uses three adjustable metallic spike-type electrodes as level detectors, exploiting the liquid's conductivity. The three electrodes which are connected with the unit are installed into the tank in accordance with application's needs. The device through its inputs processes the electrode signals and activates or deactivates an internal relay, according to the selected operating mode (*FILLING/DRAINING*). The outcome is the fluctuation of the level into a desirable *Working Region*, between a *Target* and a *Differential Level*.

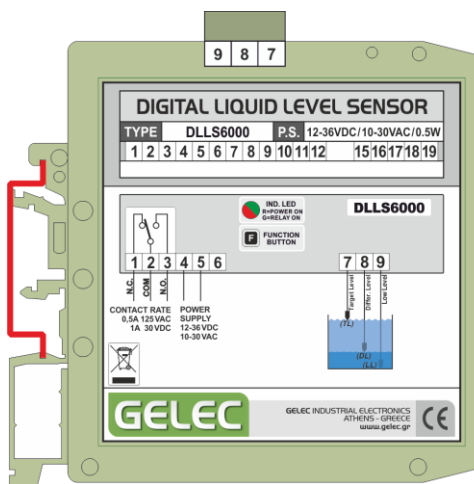


fig. 1

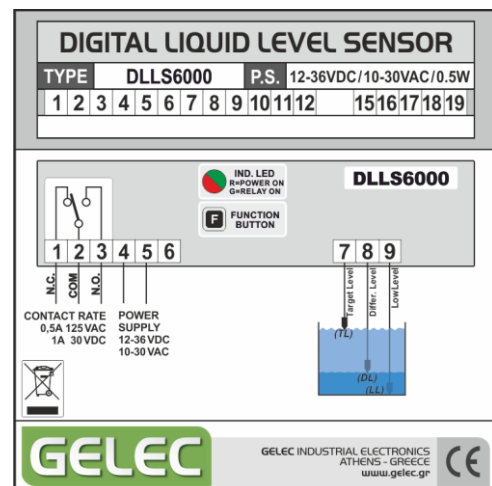


fig. 2

### MAIN FEATURES

- ▶ Reliable level control by detecting only its own signal, avoiding interferences.
- ▶ Three adjustable electrodes (spikes) used as level detectors.
- ▶ Easy selection of the *Target*, *Low* and *Differential* level set-points.
- ▶ Programmable selection of *FILLING/DRAINING* operating mode.
- ▶ Flexibility in the tuning depending on the height of tank.
- ▶ Multicolor indication LED for the relay status.
- ▶ Level control in tanks with variety of liquids (acidic, alkaline etc.)
- ▶ Control in open tanks without the danger of sensor damage from falling water.



## 5. CONTROL UNIT DLLS6000

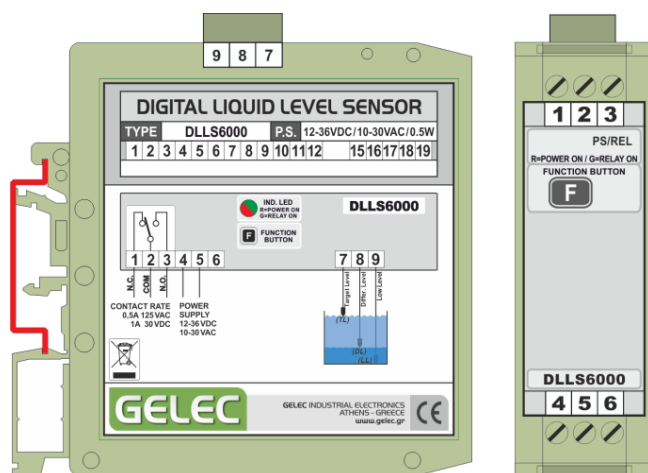


fig. 3

The DLLS6000 is a complete unit with built-in electric connection terminals, electronic board, a function button, a multi-color status indication LED, in light green box suitable for electronic devices, and DIN rail mounting. The unit is made to be installed at the inside of an electrical control panel, placed on a mounting rail of  $\Omega$  type (NS32/NS35).

## 6. ELECTRICAL SECTION



fig. 4

### POWER SUPPLY (Terminals #4 - #5)

The **DLLS6000** includes an integrated power supply circuit. The maximum power consumption is approximately 0.5W in total operation, with all indicators and relay activated.

Connect the power source with the terminals **(4)** and **(5)**. The polarity is not important, as the internal power circuit includes electronic components for non-polarity connection. When the unit is powered, the indicating led turns red.

The power supply can fluctuate between 10 and 30V Alternative (~AC) or 12 and 36V Direct (-DC), either regulated or unregulated. There is not an electrical safety fuse in the internal power circuit. Connection to a different voltage may cause fire, electric shock or damage.

### ELECTRODES

The three immersed spikes are used as level detectors and can be made of any conductive metal provided that it is conductive and corrosion-free.

**(LL) SIGNAL OUTPUT (Terminal #9)**

Output for the connection of the (LL) electrode. This electrode transmits the signal which is detected by the (DL) and (TL) electrodes.

**(DL) SIGNAL INPUT (Terminal #8)**

Output for the connection of the (DL) electrode. Whenever the liquid reaches this point, this electrode detects the transmitted signal from the (LL) electrode.

**(TL) SIGNAL INPUT (Terminal #7)**

Output for the connection of the (TL) electrode. Whenever the liquid reaches this point, this electrode detects the transmitted signal from the (LL) electrode.

**DIGITAL OUTPUT (Terminals #1=N.C. - #2=COM - #3=N.O.)**

This output (*terminals #1-#2-#3*) works as a potential contact of a relay. These contacts allow the operation of the device that fills/drains the tank. The DPDT relay contacts are potential free (Voltage free common).

The relay's status changes whenever the tank level reaches the target point. When this output is activated the indicating led turns green.

Any wrong configuration of the relay output connection may cause permanent damage to the unit.

**INDICATION LED**

The multicolor led in the front part of the device gives us the possibility to know:



- If the device is powered on (red colour).
- If micro relay contact is activated (green colour).
- If the device is in operating mode selection process.

**FUNCTION BUTTON**

This button is used during the operating mode selection (*FILLING/DRANINING*). Refer to the corresponding paragraphs.

## 7. OPERATING PHILOSOPHY – LEVEL DESCRIPTION

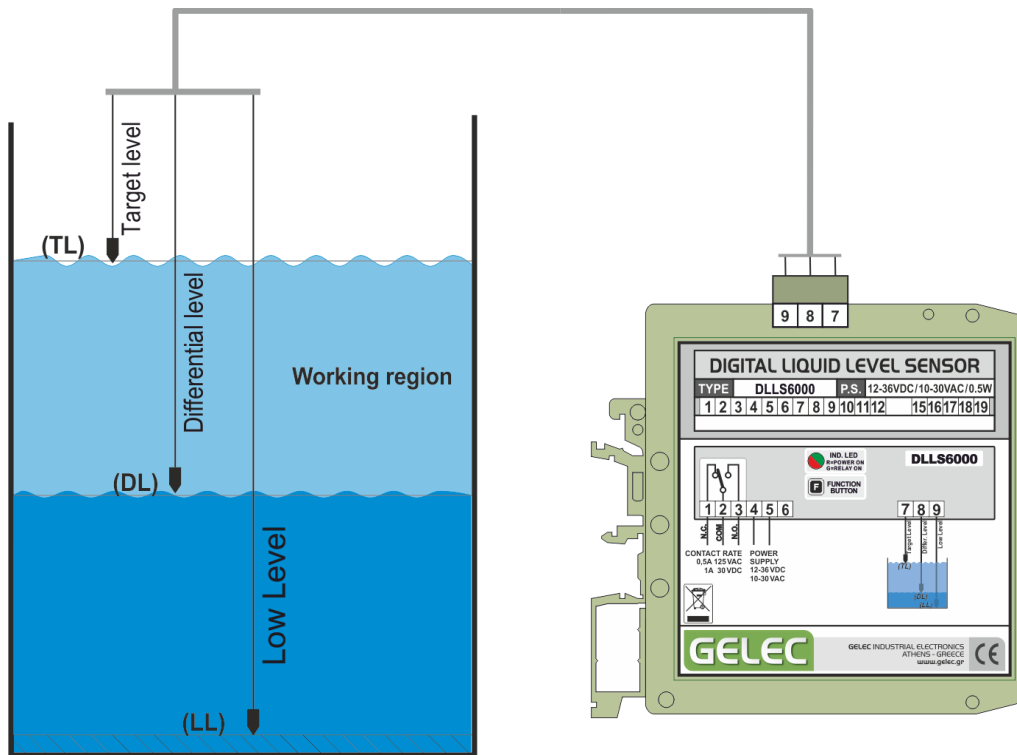


fig. 5

DLLS6000 is used for liquid level control in open tanks and uses three metallic electrodes as level detectors, exploiting the liquid's conductivity. The three electrodes which are connected with the unit are installed into the tank in accordance with the application needs and represent the three critical levels, *Low*, *Target*, and *Differential* level. As the level rises, the electrodes progressively immerse and the liquid (as a conductor) becomes a connection for the electrodes.

For the level detection there is a constant electric signal transmission at the (LL) electrode through a capacitor. Whenever the level reaches the *Differential Level* height, the signal is transferred to the (DL) electrode through the liquid and is detected from the unit. When the signal, as the level rises furthermore, is detected by both (DL) and (TL) the level has reached the desired *Target Level*.

The device through its inputs processes the electrode status signals and activates or deactivates an internal relay, according to the selected operating mode (*FILLING/DRAINING*). The relay will return to its former status, when the level drops below the (DL). The outcome is the fluctuation of the level into a desirable *Working Region* (between the *Target Level* and the *Differential Level*). An indication LED becomes green when the micro relay is activated and red when it's deactivated.

## CRITICAL LEVELS

The DLLS6000 operating philosophy is based on a desirable working region and four *critical* liquid levels (*fig. 5*), which can be calibrated from the user to meet his application needs. The levels and their functionality are described below.

### ‣ **(LL) Low Level**

The *Low Level* (LL) represents the lowest level of the tank. You can set this level by adjusting the electrode at the desirable height. Notice that the (LL) must be below the other levels.

### ‣ **Working region**

It is the desirable region which the liquid level fluctuates, either in *FILLING* or *DRAINING* mode. The working region is between (TL) and (DL), which are selected by the user.

### ‣ **(DL) Differential Level**

It is the level which the liquid returns to, after reaching the (TL) and also where the relay changes its status. (DL) must be lower than the (TL) and it can be set by adjusting the electrode at the desirable height.

### ‣ **(TL) Target Level**

It is the desirable level and the point that the liquid begins falling back to the Differential Level (DL). The digital output activates or deactivates according to the operating mode (F/D). (TL) must be higher than the (DL) and it can be set by adjusting the electrode at the desirable height.

## RELIABLE DETECTION

The DLLS6000 through its software compares its input signals (DL and TL) with the (LL) transmitting signal. Only a match between those signals leads to further decisions from the device. This feature gives the ability to ignore 'misleading' humidity or signal interferences that could exist in the tank during level detection.

## 8. FILLING / DRAINING OPERATING MODES

DLLS600 has two programmable operating modes for liquid level control, *FILLING MODE* and *DRAINING MODE*. The user determines whether the level control is done through filling or draining mode.

### **FILLING MODE (F)**

Filling mode (F) is suitable for applications where the controlled tank drains and you need to FILL it, in order to maintain the liquid into the working region.

In filling mode, the relay at the beginning is activated and fills the tank (provided that the level is detected under the TL) and deactivates when the level reaches the (TL). At the following operating circles, the relay activates each time the level reaches the (DL) and deactivates when the level reaches the (TL). (*fig. 7*)

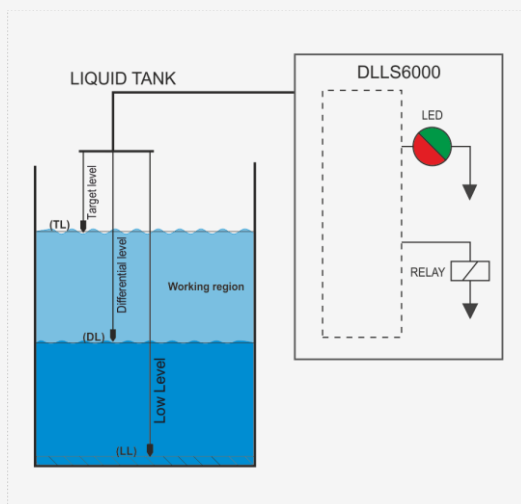


fig. 6

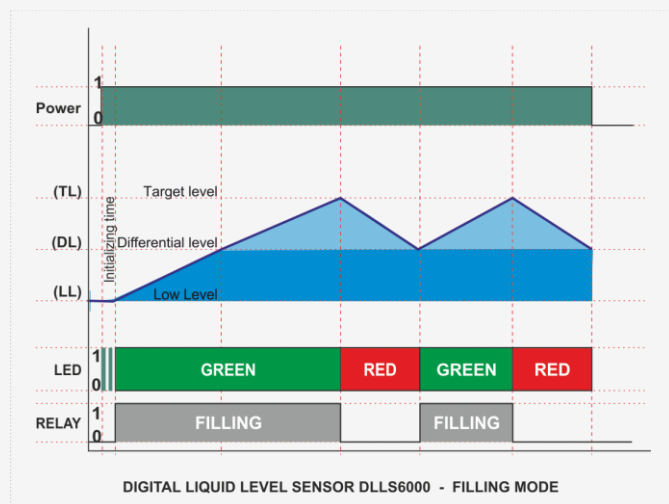


fig. 7

### **DRAINING MODE (D)**

Draining mode (D) is suitable for applications where the controlled tank fills and you need to DRAIN it, in order to maintain the liquid into the working region.

In draining mode, the relay at the beginning is de-activated (provided that the level is detected under the TL) and the tank is filling and activates when the level reaches the TL. At the following operating circles, the relay activates each time the level reaches the (TL) and deactivates when the level reaches the (DL). (*fig. 9*)

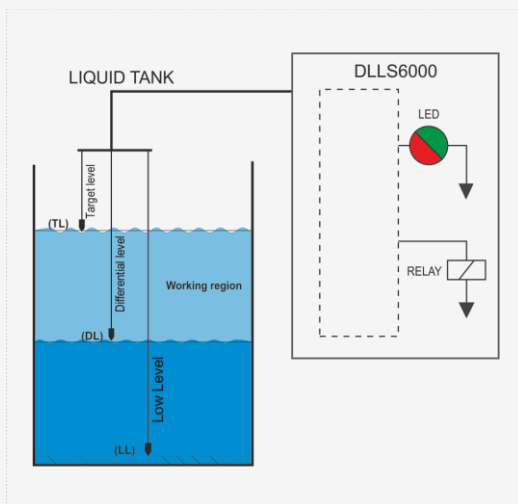


fig. 8

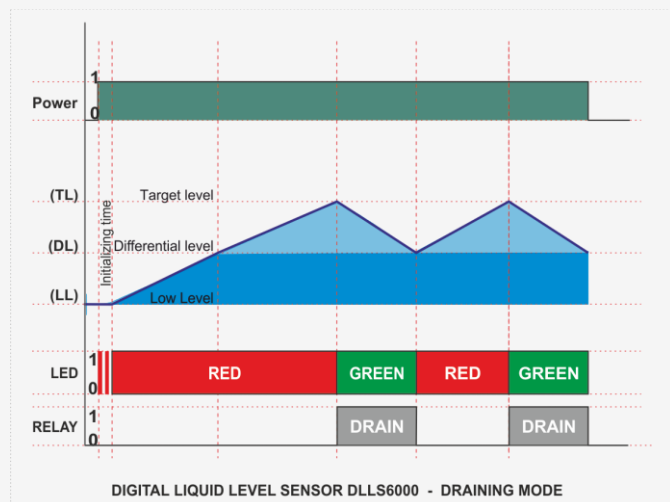


fig. 9

### OPERATING MODE SELECTION (F/D)

You can see the mode that the DLLS6000 unit operates by the flashing colour of the LED just after the device power supply. According to the preprogrammed operating mode, the led flashes for three seconds with the corresponding color.

*Flashing RED : DRAINING MODE*  
*Flashing GREEN : FILLING MODE*

The operating mode (F/D) can be changed with the following procedure.

- ▶ Press the *FUNCTION BUTTON* before the unit power supply.
- ▶ With the button pressed supply the unit. The led alternates color (green-red).
- ▶ Keep the button pressed till the led stabilizes. The current color represents the selected operating mode, which is the opposite of the previous one.
- ✓ Release the button. The new selection is automatically saved.

### NOTE

When the power is interrupted and the liquid level is between the (TL) and the (DL), the relay will be deactivated. After the power is restored, if the device operates in filling mode, the relay will be activated and the tank will fill up to the (TL). If the device operates in draining mode, the relay will remain deactivated until the level comes up to the (TL) and then it will be activated for the drain to begin.

## 9. INSTALLATION

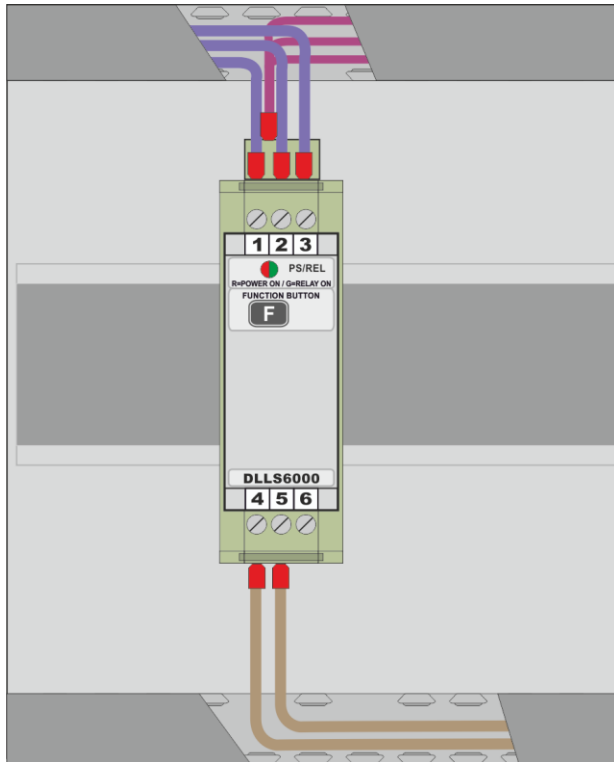


fig. 10

Place the DLLS6000 in an appropriate location. Do not install in a dusty, humid, or vibrating environment. Do not place it near heater, or air conditioner. Keep it away from air, steam, open flame, extremely high or low temperature, and humidity. Keep liquids away from the DLLS6000. Spillage into the cabinet may result to fire, electric shock, or equipment damage. Do not block the ventilated slots above and below the unit.

If a small object or liquid falls/spills into the DLLS6000 cabinet, unplug the unit immediately. Have the unit checked by a qualified service engineer before using it again.

The DLLS6000 is composed of an electronic board and a plastic box suitable for electrical and electronic devices. At the rear there is a clip for the mounting. The unit is made to be installed inside an electrical control panel, placed on a mounting rail of  $\Omega$  type DIN NS32/NS35 (fig. 10). In the rearward there is a clip for the mechanical mounting (lock) on the rail, with the release hook at the bottom.

A 15mm extra space below and above the unit is needed, for the connection wires. Ensure that the wires are smoothly curved and not bended.

## ELECTRICAL CONNECTIONS

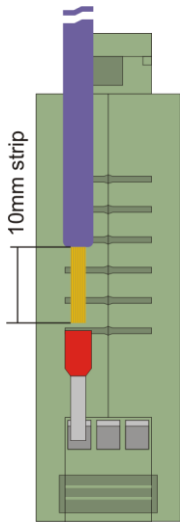


fig. 11

The unit is equipped with two 5mm pitch connectors located at the top and bottom. Let some free space (about 15mm) at both top and bottom sides for the wires to be inserted and connected properly. Insert and screw only one wire in each terminal in order to be in compliance with VDE norms.

The cable may be rigid solid from 0.2mm<sup>2</sup> up to 4.0mm<sup>2</sup> or flexible stranded from 0.2mm<sup>2</sup> up to 2.5mm<sup>2</sup> (24-12AWG) (stranded with ferrule or plastic sleeve up to 0.75mm<sup>2</sup>) stripped over 10mm length.

**Always follow the instructions given by the manufacturer and use the DLLS6000 according to its specifications.**

## IO. ELECTRICAL CIRCUIT DIAGRAM

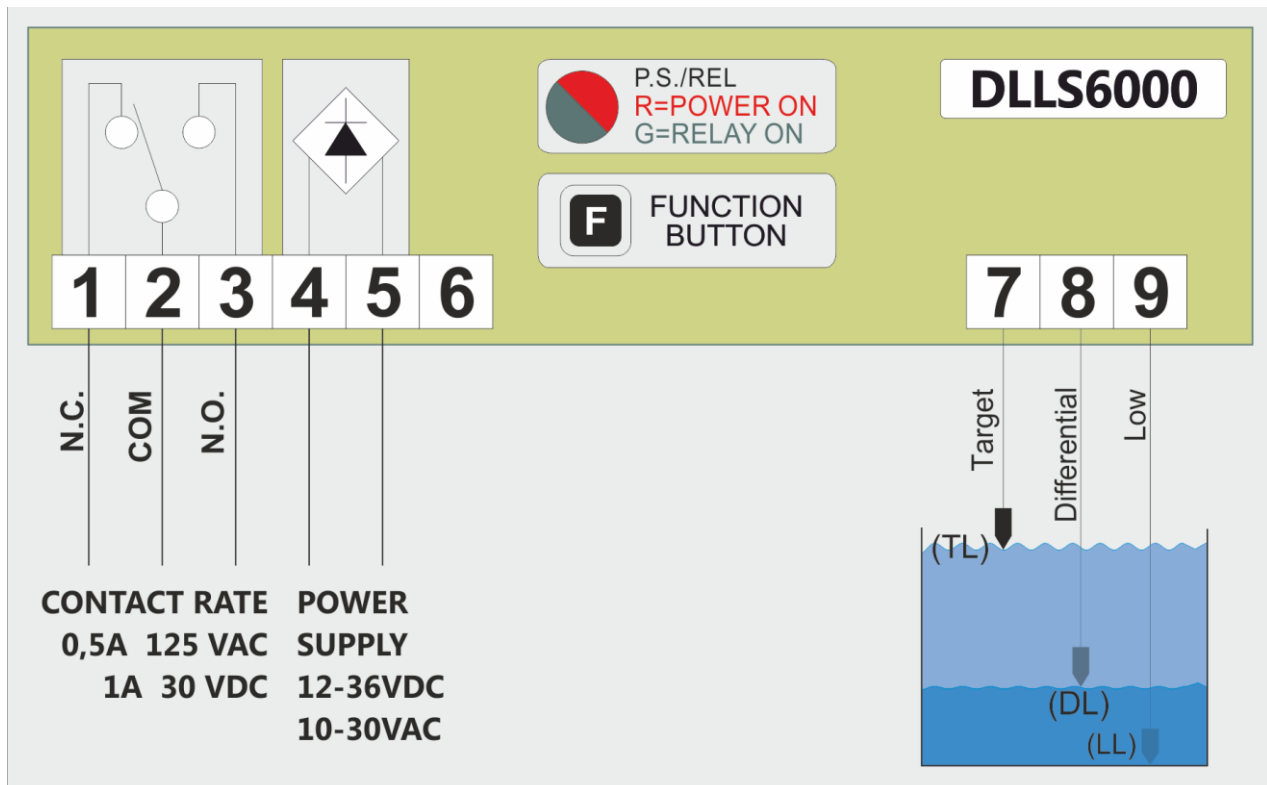
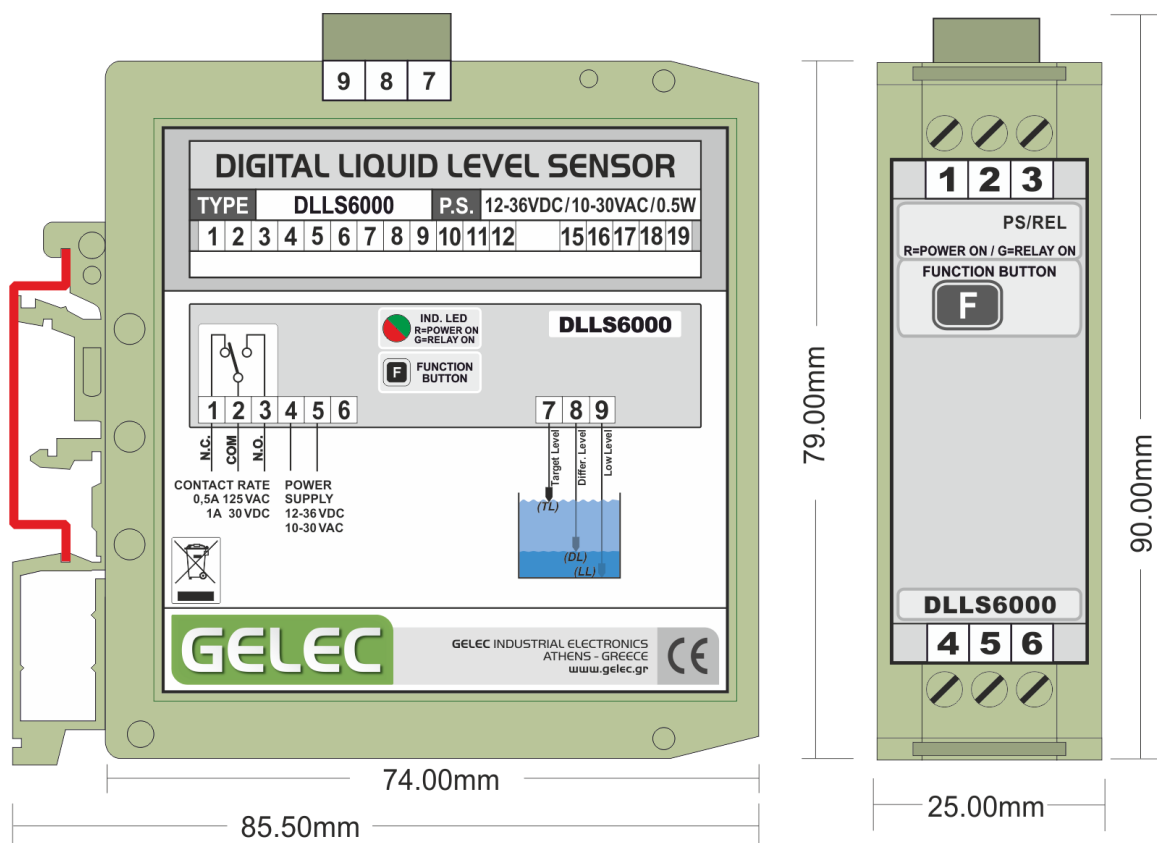


fig. 12



## II. DIMENSIONS



## 12. TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS	
POWER SUPPLY:	10-30V AC / 12-36V DC
FREQUENCY:	50 - 60 Hz
ABSOLUTE SUPPLY LIMITS:	10-30V AC / 12-36V DC
POWER CONSUMPTION:	0.5W max.
PRODUCT CLASS:	III
DIGITAL OUTPUT:	1 DPDT Relay - potential free
RESISTANCE (initial):	Maximum 50mΩ at 1A 6 VDC
RATING (resistive):	0.5A 125 VAC or 1A 30 VDC
MAX SWITCHING CURRENT:	2A
MAX SWITCHING POWER:	62.5AV - 30W
MAX SWITCHING VOLTAGE:	250VAC - 220 VDC
MAX SWITCHING CURRENT:	2A
MIN SWITCHING LOAD:	0.01mA 10mVDC
CONTACT LIFE:	Min 1x10 <sup>8</sup> mechanical / Min 5X10 <sup>5</sup> electrical (1A-30VDC)
MAGNITUDE ACCURACY:	±0.2% Typical
RATIO MATCH ACCURACY:	±0.031% Typical
OUTPUT IMPEDANCE:	15MΩ Typical
ELECTRICAL CONNECTIONS:	5mm Pitch screw connector terminals
TERMINAL BLOCK CONFIGURATION:	9 Terminal ends
TERMINAL BLOCK PLATING MATERIAL:	High quality copper
CLAMPING SURFACE PROTECTION:	Galvanic nickel or Tin plating surface
CLAMPING PARTS RESISTANCE:	Electrolytic - rust - stress corrosion cracking
CONNECTION DATA:	IEC Rigid solid / 0.2 - 4.0mm <sup>2</sup> IEC Flexible stranded / 0.2 - 2.5mm <sup>2</sup> IEC AWG 24 - 12
HOUSING BOX:	Semi-crystalline thermoplastic polyamide PA 6.6 case
INFLAMMABILITY CLASS:	V0 (UL94)
WATERPROOF PROTECTION:	No protection (IP20)
INSTALLATION POSITION:	Inside an electrical control panel
MOUNTING:	DIN NS32/NS35 (35mm) Rail mount
UNIT ABSOLUTE DIMENSIONS:	W25mm H90mm D85 mm
HOUSING AREA:	W25mm H120mm D86mm
OPERATING TEMPERATURE:	-20 +70°C (-4 +158°F)

*Specifications are subject to change without prior notice.*

**13. DECLARATION OF CONFORMITY****DECLARATION OF CONFORMITY**

THE MANUFACTURER:	GELEC Co. Ltd
ADDRESS:	4 Kikladon Str. 151 25 Marousi Athens - Greece
DECLARES THAT THE PRODUCT:	DIGITAL LIQUID LEVEL SENSOR
TYPE:	DLLS6000
OPTIONS AND VERSIONS:	This Declaration covers all options and versions of this product.
<u><i>Complies with the requirements of the European Directives:</i></u> 89/336/EC - 92/31/EEC - 73/23/EC - 93/68/EEC	
<u><i>And the following European Harmonized Standards have been applied:</i></u> EN61000-6-4 ed. 2001 - EN61000-6-2 ed. 2001 - EN60950 ed. 2000	
<p align="center"><b>EEC NORMS</b></p> <p>The product "DIGITAL LIQUID LEVEL SENSOR" type "DLLS6000" is designed and produced by the manufacturer "GELEC Co. Ltd" to be in compliance with the EEC norms applying to it.</p>	



**INDUSTRIAL ELECTRONICS**

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