

Original Operating Instructions

# DULCOLEVEL

## Radar Level Sensor





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# Safety

For safe operation, observe the information in the "Safety" chapter and the handling instructions in these operating instructions.

## Personnel Requirements

All work or actions on the device should only be carried out by qualified, trained personnel. The personnel must meet the following requirements:

- Personnel has been authorized by the manufacturer.
- Personnel is familiar with national regulations.
- The operating instructions have been read and understood.

## Intended Use

The Radar Level Sensor DULCOLEVEL is intended for commercial and industrial measurement of all types of process chemicals and liquids in plastic tanks using radar technology. The measurement is made from the outside vertically to the medium with a maximum permissible deviation of +/- 4°.

The sensor is not approved for use in hazardous areas, for flammable or radioactive liquids. The sensor is not intended for outdoor use.



# Safety

## Foreseeable Misapplication

Only use the sensor in accordance with its intended use. Application-specific hazards may occur if used improperly.

## General Safety instructions

The sensor corresponds to the state of the art in compliance with the usual regulations and guidelines. It may only be operated in a technically perfect and operationally safe condition.

When used with a pump, additionally observe the safety instructions in the original operating instructions of the pump.

For use in a plant:

If the radar sensor is integrated in a plant where a restoration of the power supply after failure or a disturbance of the power supply may lead to dangerous situations, a device shall be provided in the plant to prevent this.

## Modifications to the Device

Unauthorized conversions or modifications are expressly prohibited and can lead to unforeseeable dangers.

- For safety reasons, only the accessories specified by the manufacturer may be used.
- If modifications are necessary, contact ProMinent service, see "Troubleshooting" on page 16.

## Repairing

The sensor must not be opened.

- Follow the instructions in the troubleshooting chapter.
- If repair is necessary, contact ProMinent service.

## Notes on Radar Frequencies

Observe the national and regional regulations for the use of radar frequencies.

The sensor is certified according to FCC/IC. Further information can be found on the nameplate, see page 7.

## Disposal

This device is marked in accordance with the European Directive 2012/19/EU on waste electronic and electronic equipment (WEEE). The directive provides the framework for valid take-back and recycling of waste equipment.



The sensor is made of recyclable materials. Therefore, take it to a specialized recycling company for disposal. Observe the applicable national and regional regulations.



## Scope of Delivery

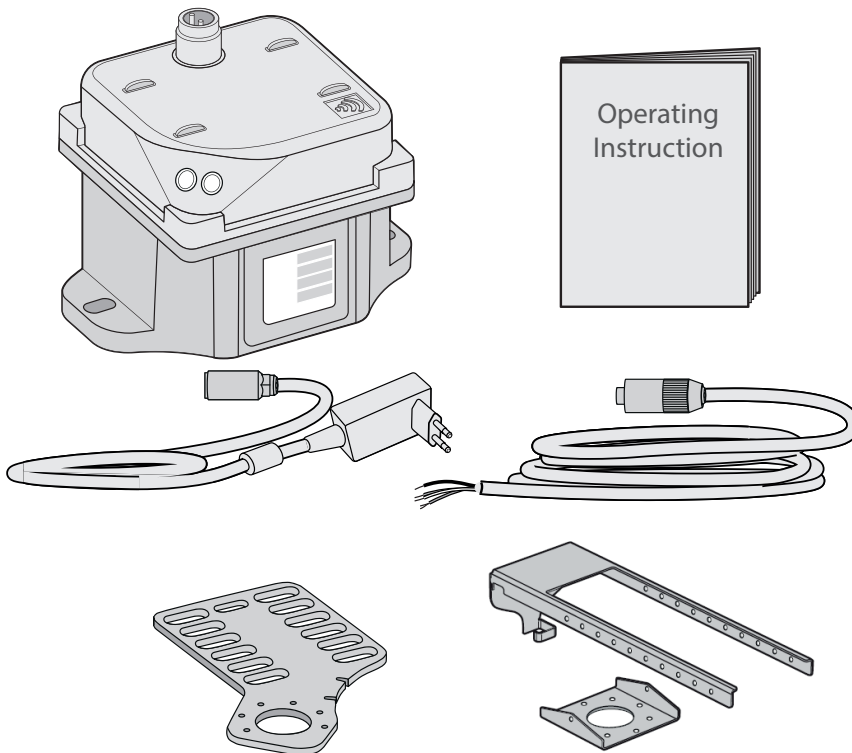
Check the scope of delivery:

- Sensor
- Plug-in power supply (part no. 1121352) or PLC connection cable (part no. 1022537)
- Optional accessories e. g. mounting plate (part no. 1119041) or IBC / wall mounting bracket (part no. 1130661)
- Documentation

Optional accessories for your sensor can be found in the ProMinent WebShop\* or ordered from your local sales person.

Screws for the mounting holes are not included in the scope of delivery.  
Use screws with a diameter  $\leq 5$  mm or  $\leq$  M5.

\* The WebShop is only available in selected countries. Please check your local ProMinent website to see if there is one available in your country.





## Technical Data

Maximum angle	+/- 4°
Measuring range	0.1-15 m
Measurement accuracy	+/- 5 mm
Electrical connection	18-30 VDC
	1.8 W <sup>max</sup> 0.1 A
	<b>Note:</b> Power is supplied via a 100-240 V plug-in power supply unit (24 V supply voltage) or via the PLC (24 V DC voltage SELV)
Degree of protection	Protection against contact and moisture in accordance with IP 66 (EN 60529) and NEMA-4X/indoor (NEMA 250) if powercable or 0/4-20mA cable is connected properly.
Degree of pollution	2
Power supply	Overvoltage category II
Height	max. 2,000 m (ASL)
Ambient humidity	max. 95 %
Temperatures	
Storage temperature	-10 °C to +50 °C
Environmental temperature	-10 °C to +45 °C
	<b>Note:</b> The sensor is not intended for outdoor use.
Operational temperature	+1 °C to 45 °C
Signal mA output	0/4-20 mA galvanically isolated, max. load 450 Ω. Range adjustable via Bluetooth® with DULCONNEX Blue app.

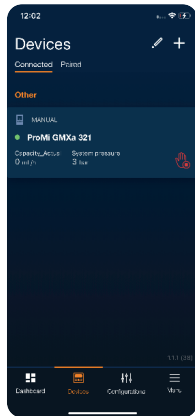


# DULCONNEX Blue App



Download the **DULCONNEX Blue App** to configure the sensor via smartphone or tablet.

Only for ProMinent devices with Bluetooth® option.

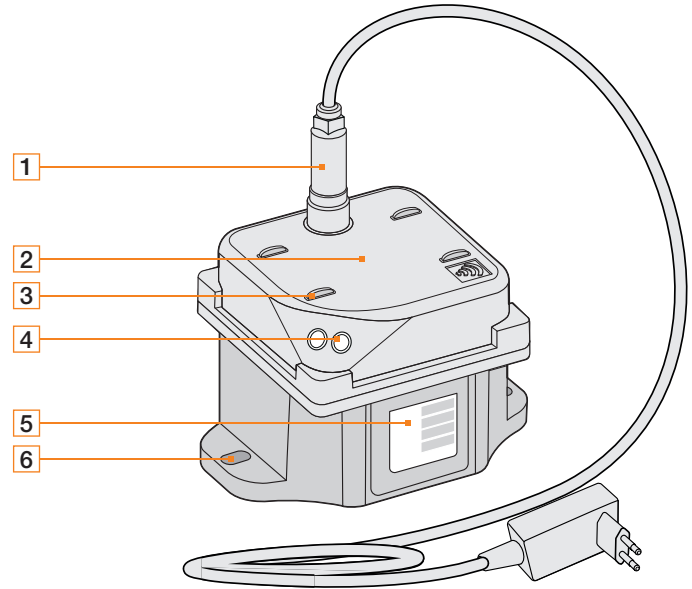


## About the App

When you open the app, the dashboard appears. At the bottom of the screen you will find the most important sections:

- **Devices**  
Overview of connected and paired devices
- **Configuration**  
Archive and management of different configurations
- **Menu**  
General settings for the app

## Overview



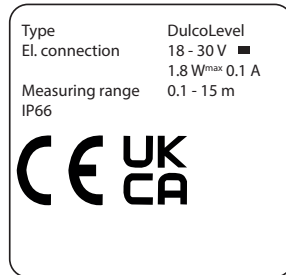
- 1** Power connection  
Alternatively connection cable to PLC.
- 2** Radar sensor
- 3** Alignment bracket for mounting with strap
- 4** Status LED
- 5** Nameplate
- 6** Mounting holes (e. g. for mounting with plate)



## Overview

### Nameplate

The nameplate contains the most important data for identification and use of the sensor.



**Notice:** You need the last 4 digits of the serial number (Ser.No. on the nameplate) to connect the sensor with the DULCONNEX Blue App (see Initial Start-up).

In the example shown, this corresponds to the digits "8234".

**Notice:** The QR code on the nameplate is for ProMinent internal purposes only.

The device meets the requirements for electrical safety according to EN 61010-1. The device meets the requirements of the Radio Equipment Directive 2014/53/EU and the RoHS Directive 2011/65/EU and is CE marked.

## Function

The level sensor DULCOLEVEL is a radar sensor for level measurement of all types of liquids in plastic tanks and IBC storage tanks:

- Measures the distance between the sensor and the surface of the liquid.
- Contactless measurement through the plastic wall of the tank.
- Suitable for all ProMinent plastic storage tanks as well as plastic tanks from other suppliers.

Configure the sensor by using the DULCONNEX Blue App.

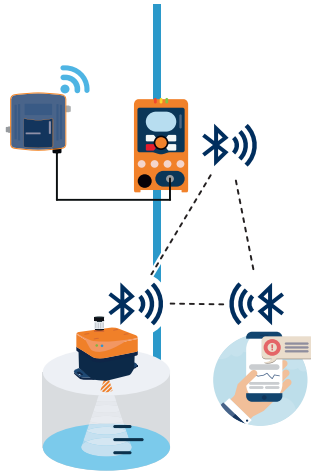
### Notice: Use of a Mixer

When using a mixer, the height of the liquid level may change. This can lead to incorrect measurement results. An even liquid level is required for a reliable measurement result. Select the measuring point outside the flow if possible.

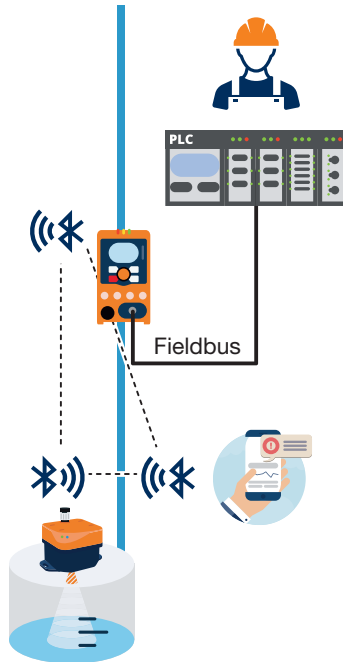


# Application Options

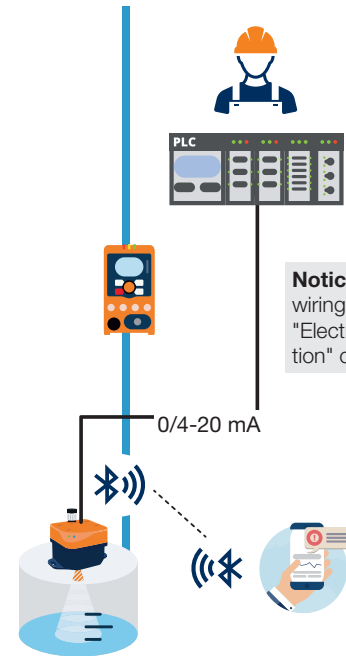
The sensor can be used in different constellations. You **always** need the DULCONNEX Blue App for setup, configuration and operation.



1. Data transfer through pump with DULCONNEX\* (optional). Connecting sensor and pump with app.



2. Data transfer through pump with PLC (Fieldbus)\*. Connecting sensor and pump with app.



**Notice:** For the wiring diagram see "Electrical Installation" on page 11.









3. Direct data transfer to PLC through 0/4-20 mA. Configuration through app.

\* For information on the connection pump to DULCONNEX or PLC, please refer to the operating instructions of the pump.





## LED Status

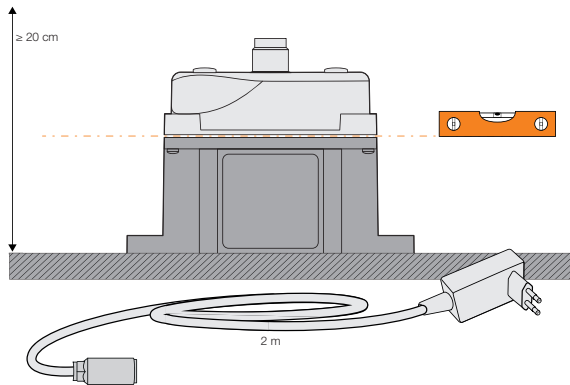
	LED Signal	Meaning
	LED flashes blue at intervals of 1 s.	Sensor is ready to be paired.
	LED lights blue continuously.	Sensor is coupled with pump.
	LED flashes blue 2 times per second.	Sensor identification was triggered in the app. Sensor is paired with the app, not with the pump.
	LED lights green continuously.	The level is in allowed range above low volume and below maximum volume.
	LED lights yellow continuously.	The level is either below low volume or above maximum volume.
	LED lights red continuously.	The level is either below empty tank setting or above overflow setting.
	LED flashes alternately blue and red.	Update in progress.
	LED flashes permanently red.	Error. Observe the notes in the app and the "Troubleshooting" chapter.



## Mounting

### Observe the following mounting instructions:

- Tilting the sensor can lead to measurement errors. Always mount the sensor horizontally.
- Secure the sensor against movement. Also ensure that the tank is standing securely.
- Make sure that the tank surface and the sensor bottom are clean.
- The tank must be easily accessible (min. 80 cm around the tank).



### Mount Sensor

You can mount the sensor with the mounting plate, straps or your own fixtures.

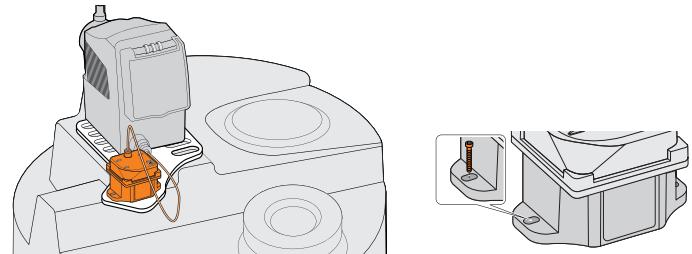
**Notice:** Mount sensor horizontal to tank with a maximum incline of  $\pm 4^\circ$ .

### Mount Sensor with Mounting Plate

To attach the sensor to the plate, screw the sensor to the mounting holes provided on both sides using a screw with a diameter  $\leq 5$  mm or  $\leq$  M5.

As an alternative to the mounting plate, you can also use other equipment.

**Never drill through the tank!** Liquids can leak out.



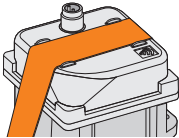


## Mounting

### Mount Sensor with Strap

To mount the sensor with a strap, pass the strap through the alignment brackets provided.

Make sure that the sensor cannot move during operation.

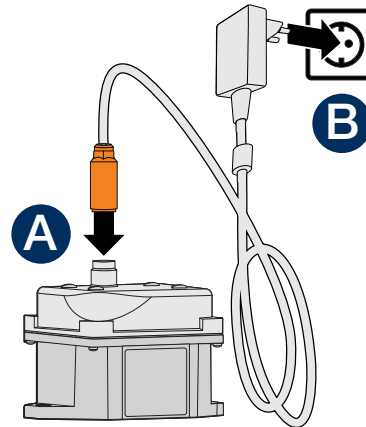


## Electrical Installation

### Application Option 1 and 2

You can connect the sensor to your pump via Bluetooth® to send level information directly to the pump. The pump is thus able to output corresponding status messages, which can be monitored e. g. via DULCONNEX or PLC. For more information, please refer to the original operating instruction of your pump.

1. Connect plug-in power supply to sensor (A).
2. Plug in power supply (B).





## Application Option 3

You can connect the sensor directly to the PLC with a 0/4-20 mA connection.

The sensor has an active mA output: The mA output actively supplies an output current without a supply voltage being applied from the outside. The mA output is galvanically isolated.

The mA output can be configured via Bluetooth with the DULCONNEX Blue app via Bluetooth.

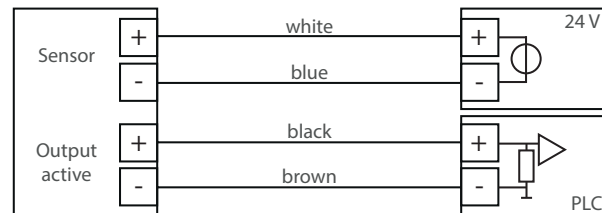
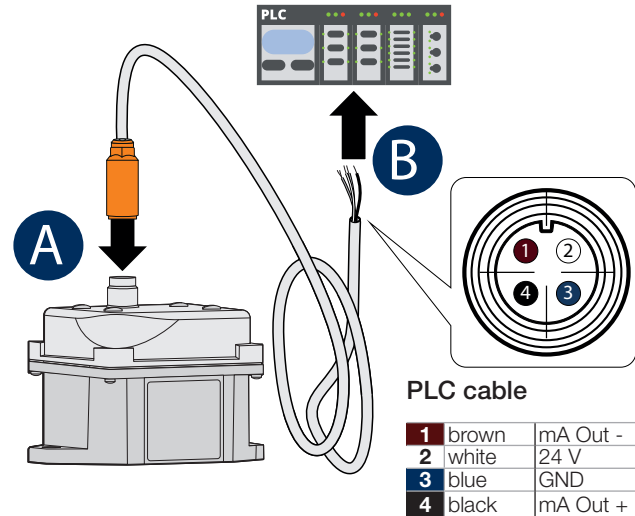
## ATTENTION

### Destruction of the evaluation devices

Only passive evaluation devices may be connected to the mA output. If the mA output is connected to a PLC, for example, the connection type on the PLC must be selected as 4-wire. The connection type 2-wire leads to a malfunction and possibly to the destruction of the evaluation devices.

### Procedure:

1. Connect connection cable to sensor (A).
2. Connect cable to the PLC (B).





## Initial Startup



### Connect Sensor to Pump (Wizard)

Use the wizard in the DULCONNEX Blue App to connect the sensor to the pump.

#### Prerequisites:

- DULCONNEX Blue App is installed on your mobile device. You cannot set up or operate the sensor without the app.
- Bluetooth® is enabled on your mobile device and pump.
- The sensor and the pump are connected to power.

#### Procedure:

1. Open DULCONNEX Blue on your mobile device.
2. Switch to the "Devices" view.
3. Tap on .  
All Bluetooth devices that are nearby are displayed.
4. Tap on .  
The wizard will start and guide you through the connection process.

The sensor is connected to the pump and the pump is displayed in the "Devices" view in the "Connected" tab.

**Note:** During set-up you will need the last 4 digits of your sensor's and pump's serial numbers.

### Alternative: Connect Sensor Only

If you do not have a pump with Bluetooth® and want to use the sensor with a PLC as described in application option 3, follow the steps below.


#### Prerequisites:

- DULCONNEX Blue App is installed on your mobile device. You cannot set up or operate the sensor without the app.
- Bluetooth® is enabled on your mobile device.
- The sensor is connected to power.



## Initial Startup

### Procedure:

1. Open DULCONNEX Blue on your mobile device.
2. Switch to the "Devices" view.
3. Tap on .  
All Bluetooth devices that are nearby are displayed.
4. Tap on + next to the sensor's name.  
The sensor will be connected to the app. If the connection is successful, a message appears.
5. Enter device PIN.  
**Note:** The PIN is the last 4 digits of the sensor's serial number.

The sensor is connected to the app and is displayed in the "Devices" view in the "Connected" tab.

## Configuration

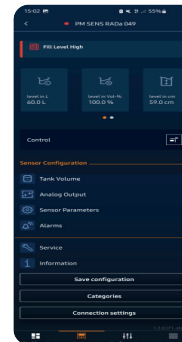
### Set up and Configure Sensor

In order to use the sensor, the following steps must be performed after connection to the pump or PLC:

- Calibrate tank size: Mapping of sensor distance measurement to tank volume
- Set alarms



**For more information on configuration, also see the videos at [www.prominent.com](http://www.prominent.com).**



Additionally, the following configuration options are available in the DULCONNEX Blue App:

- Configuration of analog output
- Error logbook
- Firmware updates
- Copying configurations from one tank to another
- Commissioning report



## Operation

### Firmware Update

You can see the current firmware version in the sensor's settings under "Information".

#### Procedure:

1. In the "Devices" view, tap on the sensor.
2. Tap on "Service".
3. Tap on "Firmware update".
4. If there is a newer firmware, follow the instructions in the app.

### Disconnect Sensor

You can disconnect the sensor at any time via the app.

#### Procedure:

1. In the "Devices" view, tap the sensor or the pump.
2. Press the "Connection settings" button.
3. Tap the "Disconnect" button.
4. Confirm the disconnection process with "OK".

If you also want to delete the sensor from the devices list, switch to the "Coupled" tab and tap the "Delete" button on the sensor.

## Cleaning & Maintenance

### NOTICE

Unsuitable cleaning products can damage the sensor.

- Do not use chemicals or strong detergents.
- Clean the sensor with a dry cloth.

### Maintenance

The sensor is designed so that no maintenance is required.

During installation and operation, ensure that the sensor base and tank surface remain free of contamination.



### NOTICE

#### Damage due to opening of the housing

The sensor must not be opened. In case of malfunction and damage, contact the ProMinent Service.



## Troubleshooting

### Troubleshooting

In the following table you will find possible errors and information on troubleshooting. If you cannot rectify the fault yourself, contact ProMinent Service.

Error	Cause	Action
The connection to the pump cannot be established.	The DULCONNEX Blue App is not installed.	Install the app and run the connection process with the wizard. See "DULCONNEX Blue App" (page 6) and "Connect Sensor to Pump (Wizard)" (page 13).
	Bluetooth® not activated on the smartphone.	Activate Bluetooth® on your smartphone.
	The pump has no Bluetooth® module, a Bluetooth® module that is too old or outdated software.	Contact the ProMinent service.
The sensor provides incorrect measurement results.	The tank size is not calibrated.	See "Configuration" (page 14).
	The sensor is mounted incorrectly.	See mounting instructions in "Mounting" (page 11).
LED does not light up.	Sensor is broken.	Contact the ProMinent Service.
	Power supply is not connected.	Check electrical connection, see "Electrical Installation" (page 11).
During pairing, the app does not find the sensor.	The sensor is already connected to the pump.	No action required.
	The sensor is already connected to another smartphone. The sensor can only be connected to one smartphone.	Disconnect the existing connection and restart the connection process.