

# SPECIFICATION

Grundfos LC Controller  
Model: LC 231

<b>Document</b>	Grundfos LC 231 Pump Station Controller Spec
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## PART 1 GENERAL

### 1.01 HARDWARE

- A. The controller shall contain Bluetooth Smart technology for connection to a smart device application (app).
- B. The controller shall be microprocessor based capable of receiving firmware updates via removable USB storage device.
- C. The controller shall be a standard product developed and supported by the pump manufacturer.
- D. The controller manufacturer shall have a smart device app for interfacing directly with the pump station controller.
- E. The controller shall have an LED and 7-segment user interface that displays current level to one-hundredth of an inch (analog), float switch status, pump running status, alarm indication with corresponding alarm code.
- F. The controller shall have analog inputs capable of supporting 0-5V, 0.5-3.5V, 0-10V, 0-20mA, or 4-20mA signal inputs.
- G. The controller shall have relay outputs capable of operating loads up to 250V/2A.
- H. The controller shall have configurable input/outputs (CIO) that can be set to be a digital input, analog input, PT100/1000 input, or digital transistor output by selection in the smart device app.
- I. The controller shall have an internal 24VDC power supply for supplying power for field connected sensors up to 250mA.
- J. The controller shall include a built-in buzzer
- K. The controller shall display the following as status readings from a single display on the controller:
  - 1. Current station liquid level with corresponding water graphic
  - 2. Alarm status on the station (if any)
  - 3. Lead pump on and off setpoints and graphically display on water graphic
  - 4. System status with current operating mode
  - 5. Status of each pump with current operating mode and total hours run on the pump
  - 6. Estimated flow-rate, (not requiring flow meter connection)
  - 7. Date and Time
- L. The controller system shall have as a minimum the following hardware inputs and outputs:
  - 1. 2 x digital inputs (DI)
  - 2. 2 x digital input/output (DI/DO)
  - 3. 2 x configurable relay output
  - 4. 2 x combined overheat (PTC)/moisture switch input
  - 5. 2 x configurable input/output terminals (DI/DO/AI/TI)
  - 6. 2 x 24VDC power supply for sensors

- M. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor.

## 1.02 FUNCTIONALITY

- A. Control and monitoring of pumps in typical pumping (i.e. waste water lift stations, industrial sumps, drainage, storm water, etc) or simple pumping applications (tank fill in water supply, irrigation, etc).
- B. The controller shall come with pre-built configuration parameters, which are selectable via the user interface or configured using the { Android/iOS } smart device app • Bluetooth Smart technology.
- C. The controller shall have the ability to lock controls and access through the keypad and through a PIN code using the smart device app.
- D. The controller shall be capable of displaying instantaneous power consumption (kilowatts) and cumulative energy consumption (kilowatt-hours) , smart device app.
- E. The controller shall have built in data logging capability. Logged values shall be able to be transmitted over open protocols to SCADA systems: The following values shall have the ability to be transmitted over open protocols to SCADA systems:
1. Last 20 alarm conditions
  2. Station operating hours
  3. Time since service
  4. Total number of pump starts
  5. Pump starts per hour
  6. Individual pump operating hours
  7. Power consumption
  8. Current consumption per pump
- F. The controller shall contain a soft-key button for each pump, to select between Auto/ Manual / Off.
1. Through the device smart device app, Manual control shall have the ability to be customized to automatically return control to the Off or Auto selections after the system has been in Manual control for a configured period-of-time.
- G. The controller shall contain setpoint adjustment for pump activation/deactivation and level alarms.
1. System shall support up to five control levels for both analog level transmitter or float switch operation.
  2. System shall support a simple application where only one float switch is present (i.e. single float switch operation).
- H. The controller shall contain station optimization including:
1. Anti-seizing feature to periodically operate the pumps to prevent the pumps from choking or seizing due to limestone build-up or other deposits.
  2. Prevent the mains load with a power-on delay when several pumping stations are started up at the same time.

3. Built-in protection against water hammer as quick restart/simultaneous start is blocked and delayed.
4. Selection to allow automatic alarm resetting.
5. Setting for pump stop delays.

I. System Setup

1. The controller shall have a setup wizard that allows the user to quickly set up via the smart device app and easily uploaded to the same model controller.
2. All controller settings shall have the ability to be saved using the smart device app and easily uploaded to the same model controller.

**1.03 Faults and Alarms**

- A. The controller shall store up to 20 warning and alarms.
- B. The controller shall record the time, date and duration of each alarm.
- C. The controller shall allow the user the ability to disable all faults and alarms.
- D. The controller shall allow the user the ability to adjust a time delay of activation for all faults and alarms.
- E. The controller shall allow all faults and alarms shall to be selectable by the user as automatic reset or require manual user reset at the system.
- F. The controller shall display the following alarm conditions:
  1. Dry running (low level)
  2. High water level
  3. Incorrect voltage phase sequences or missing phase
  4. Sensor inconsistency or failure for both analog and digital input level devices
  5. Intrusion detection
  6. Water on floor
  7. Pump too many restarts
  8. Pump overheating (thermal) and moisture detection (seal)

**1.04 Communication**

- A. The pump system controller shall have the ability to communicate through the following common fieldbus protocols via communications card installed inside the controller:
  1. Modbus RTU
  2. Modbus TCP/IP
  3. BACnet
  4. PROFIBUS

**1.05 WARRANTY**

- A. The pump system controller shall contain a minimum of 30-months from date of purchase and 24-month in-service.