Chem Feed 101

Chemical Feed Equipment

For Use With Commercial TeleComm (TCOM) Panels

Outline

- Nitrogen Cycle
- LCF Hardware
- LCF Programming Options
- DCF Hardware
- DCF Programming Options
- Flowmeters
- Probes

Nitrogen Reduction

- Nitrification
  - $NH_3 + O_2 + Alk + Bacteria = NO_2$
  - $NO_2 + O_2 + Alk + Bacteria = NO_3$
  - 4.6 parts O_2 + 7.1 parts Alk $\xrightarrow{\text{convert}}$ 1 part NH_3
- Denitrification
  - Need anoxic atmosphere
  - Need carbon source
  - $NO_3 \xrightarrow{\text{convert}} N_{(gas)} + O_2$ + 3.6 parts Alk

Liquid Chem Feed System (LCF)

- Peristaltic Pump
- Mixer

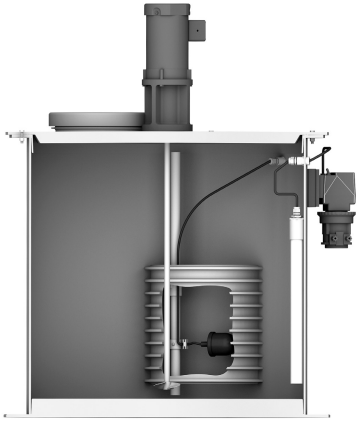
Technical Data Sheet

Liquid Chemical Feeder

Applications

Orenco® Liquid Chemical Feeders are designed for use with systems where chemical additives are needed to achieve target levels of wastewater contaminant removal.

In wastewater systems with insufficient alkalinity to meet nitrogen limits, Liquid Chemical Feeder are ideally suited for adding slurry mixtures of bases, such as soda ash.



Orenco LCF3636-AG, side cutaway view

General

Orenco Liquid Chemical Feeders are manufactured from stainless steel, PVC, and fiberglass parts for durability and corrosion resistance. BG (below-ground) units are designed to withstand a wide range of temperatures and conditions. They can be partially buried or set at-grade. AG (above-ground) units are intended only for installation indoors, protected from the elements.

The unit features a 1⁄3 hp (0.25 kW), 1750 rpm, direct-drive mixer to keep slurries in suspension. The peristaltic pump transfers chemical slurries at a maximum rate of 0.13 gallons per hour (0.49 liters per hour) to an injection point.

Standard Models

LCF3636-AG, LCF3636-AG-L, LCF3060-BG

Product Code Diagram

LCF ☐ ☐ - ☐ - ☐

- Liquid chemical feeder
- Basin diameter:
  30 = 30-in. (750-mm) diameter, BG units
  36 = 36-in. (900-mm) diameter, AG units
- Basin height:
  36 = 36-in. (914-mm), AG units
  60 = 60-in. (1524-mm), BG units
- AG = Above-ground unit
  BG = Below-ground unit
- Pump options (AG units only):
  Blank = Peristaltic pump installed
  L = Peristaltic pump, uninstalled

Materials of Construction

Basin lid	Fiberglass
Basin lid gasket	Urethane
Basin	Fiberglass
Basin bottom	Fiberglass
Mixer	Stainless steel
Mixer base	Fiberglass
Mixer blade	Stainless steel
Mixer shaft	Stainless steel
Pump tubing	Norprene®

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Liquid Chem Feed Systems

Hardware

- Peristaltic Pump Voltage (120v 1Ø Standard)
- 4-20mA Speed Control Option
- Mixer (120v 1Ø Standard)

- 2.19 gph (30RPM Model)
- 50psi
- 7/16” Norprene Tubing
- Compression Tube Nut Attachment

Operation

- Mixer (Alkalinity Applications)
  - Continuous Run
  - Timed Run (Before/After peristaltic pump operation)

- Peristaltic Pump
  - Continuous Run
  - Timer ON/OFF
  - Flow Pacing with Pre-Anoxic or Discharge Pump

Programming – Pre-Anoxic Return

- Pre-Anoxic Return pump programming options:
  - Flow Based
    - Every hour, panel looks at flow processed over the last hour (in gallons). A ratio or multiplier is input by the operator, and the panel runs the pre-anoxic return pump based on the need.
  - Timer Based
    - Operator inputs an OFF and ON time for the pre-anoxic return pump to activate as long as the recirc tank RO float is in the up position.

Programming for Chem Feed- Pre-Anoxic Rtrn.

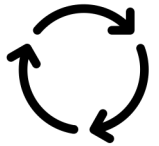
- Pre-Anoxic Pump Run
  - Timer ON/OFF
  - Hourly Look-up

- Points-
  - Flowmeter or Discharge Pumps (Forward Flow Measurement in GPM)
  - Pre-Anoxic Pump Flow Rate (GPM)
  - “Flow Multiplier” (Numeric Value)

- Equation-
  - Forward Flow for Last Hour x Flow Multiplier = Gallons to Return.
  - Gallons to Return / Pre-Anoxic Pump GPM = Pre-Anoxic Run Time.

Programming – Alkalinity Feed

- Alkalinity Feed programming options:
  - Flow Pace:
    - The peristaltic pump for alkalinity activates simultaneously with the anoxic return pump. The peristaltic pump is manually programmed to a run speed that corresponds with the amount of alkalinity desired. This option can be used with both the Flow Based and Timer based pre-anoxic return program schemes.
  - Manual Timer:
    - The peristaltic pump for alkalinity runs based on operator input of OFF and ON times.
  - Continuous Run:
    - The peristaltic pump for alkalinity runs constantly. A run speed is programmed by the operator based on an estimated daily demand.



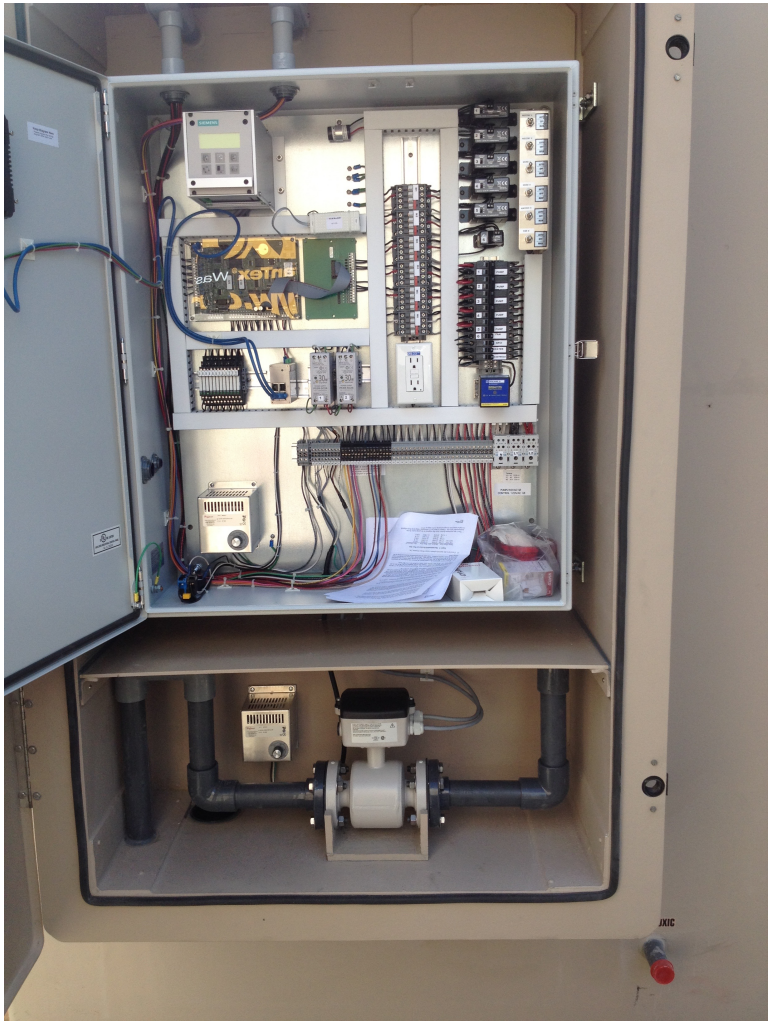
Programming for Carbon Feed

- Peristaltic Pump-
  - Flow Pacing
    - Peristaltic Pump operates in parallel with forward flow pump
      - ~ Operator Worksheet (Excel)
  - Timer ON/OFF
  - Continuous Run

Flow Meter

- 4-20mA Output
- On unit or In Panel transmitter
- Proprietary cable may be required

- Pipe size for meter
- Straight Pipe before and after meter



Probes/Sensors

Summary

- Nitrification consumes 7.14 mg/L of TKN converted, but returns 2.14 mg/L after conversion is complete
- Denitrification is favorable with C:N of 4-6, but consumes 3.25 mg/L per mg/L TN reduced
- Peristaltic pumps should be positioned above discharge point and the run to discharge should be short
- DCF have to operate in tandem with anoxic pumps
- Flow pacing is the best option if you have a flowmeter
- Probes can cause a “yo-yo” effect in the treatment plant