



**PUMP SIZING MANUAL FOR MODEL D SERIES
CLEARSTREAM WASTEWATER SYSTEMS, INC.**

This procedure enables the setup of the Denitrification System for Clearstream Wastewater Systems, Inc. Model D series. Standard recycle rate of 60% of daily flow from pump chamber back to pre-treatment chamber is required for initial system set up. Level of denitrification can be achieved by field adjustment of recycle percentage based on specific site conditions.

There are two pertinent data points needed to make the calculation:

1. The estimated daily flow (gpd) of the facility.
2. The actual gallons per minute (gpm) being discharged into the disposal field for absorption.

Once this information is established, use the formula below to calculate the required pump size to properly meet the system and disposal field needs.

$$X + (X \text{ times } R) + F = P$$

X = Effluent disposal in gpm

R = Recycle percentage back to pre-treatment from pump chamber

F = Drip field continuous flush gpm to pump chamber

P = Pump size minimum gpm required

EXAMPLE 1: Drip Disposal System with continuous flush using P20 Pump

Drip field allows 10 gpm to discharge into soil.(X)

Recycle percentage is 60% (.60) (R)

Field continuous flush rate is 1 gpm.(F)

$10 + 6 + 1 = 17$ (P) minimum gpm pump required

At minimum operating pump pressure (30 psi), the Clearstream P20 pump delivers 22 gpm so $22 \text{ gpm} - 17 \text{ gpm} = 5 \text{ gpm}$ excess pump capacity would be discharged back into the pump chamber directly from the pump.

Note: Field flush (F) is not required for Drip designs that do not use Clearstream continuous flush method for flushing or for pressure dosing designs.

EXAMPLE 2: Pumped Discharge or Pressure Dose Disposal System without continuous flush using P20 Pump

Pumped discharge or pressure dose field requires 12 gpm discharge to disposal grid.(X)

Recycle percentage is 60% (R)

$12 + 7.2 + 0 = 19.2$ (P) minimum gpm pump required

Clearstream P20 pump delivers 26 gpm at open flow so 6.8 gpm excess pump capacity would be discharged back into pump chamber directly from the pump.

EXAMPLE 3: Drip Disposal System without continuous flush using P35 Pump

Drip field allows 20 gpm to discharge into soil (X)

Recycle percentage is 65% (R)

Field continuous flush rate 0 gpm

$20 + 13 = 33$ (P)

At minimum operating pump pressure (30psi), the Clearstream P35 pump delivers 34 gpm so $34\text{gpm} - 33\text{gpm} = 1$ gpm excess pump capacity would be discharged directly back into pump chamber.

SELECTING PUMP SIZE

In our examples the Clearstream P20 and P35 pumps are used. For Drip irrigation application, Clearstream recommends operation at a minimum of 30psi to ensure spin filter cleaning. At 30psi the Clearstream P20 provides 22gpm, using the P35 it provides 34gpm.

Other disposal applications may require higher volumes such as in pressure dosing, the P20 provides @ open flow, 26gpm, the P35 @ open flow provides 39gpm, refer to the chart in drawing B.

In some larger disposal system designs a separate discharge pump to the disposal field may be required. In those applications the Clearstream pump can be used exclusively to recycle back to the pre-treatment tank with the remainder of discharge being discharged to the pump tank.

FLOW SETTINGS

Refer to drawing (A) for parts location:

- (1) Discharge Flow Control Valve
- (2) Flow Restrictor Assembly
- (3) Pressure Control Valve
- (4) 50 PSI Gauge
- (5) Recycle Flow Control Valve
- (6) Digital Water Meter

Begin by installing (#6) digital water meter inline with the Pretreat recycle line.

Set valve (#1) fully open.

Turn pump power ON and monitor gpm flow thru the digital meter.

The Flow Restrictor (#2) directs a controlled flow back into the Pretreat recycle line, to slightly increase this flow, partially close valve (#1). NOTE: Closing valve (#1) reduces field flow. If additional Pretreat recycle gpm is needed, open valve (#5) to supplement flow; an even higher gpm into Pretreat recycle can be obtained by closing off valve (#3).

Proper pump sizing requires minimal adjustment to obtain needed Pretreat recycle gpm.

SYSTEM DESIGN

EXAMPLE

5GPM @ 60 min per day = 300gpd usage disposed.

5GPM (60%) = 3GPM @ 60 min per day = 180gpd recycled to pretreat chamber.

FIELD DOSING CYCLES CALCULATION:

Typically there are 3 different time increments used for field dosing – 1hr, 1.5hr and 2hr. For denitrification systems it is preferred to use more frequent and shorter cycles.

DOSING @ 1hr intervals gives us 24hrs/1hr interval = 24 cycles each day.

300gpd/24 cycles = 12.5gl per cycle.

12.5gl dose/5gpm = 2.5 min PUMP ON

Set Clearstream Dosing Timer as follows:

Each Dosing cycle = 2.5 min PUMP ON with 57.5 min PUMP OFF

DOSING @ 1.5hr intervals gives us 24hrs/1.5hr interval = 16 cycles each day.

300gpd/16 cycles = 18.75gl per cycle

18.75gl dose/5gpm = 3.75 min PUMP ON.

Set Clearstream Dosing Timer as follows:

Each Dosing cycle = 3.75 min PUMP ON with 1hr. 26.25 min PUMP OFF.

DOSING @ 2hr intervals gives us 24hrs/2hr interval = 12 cycles each day.

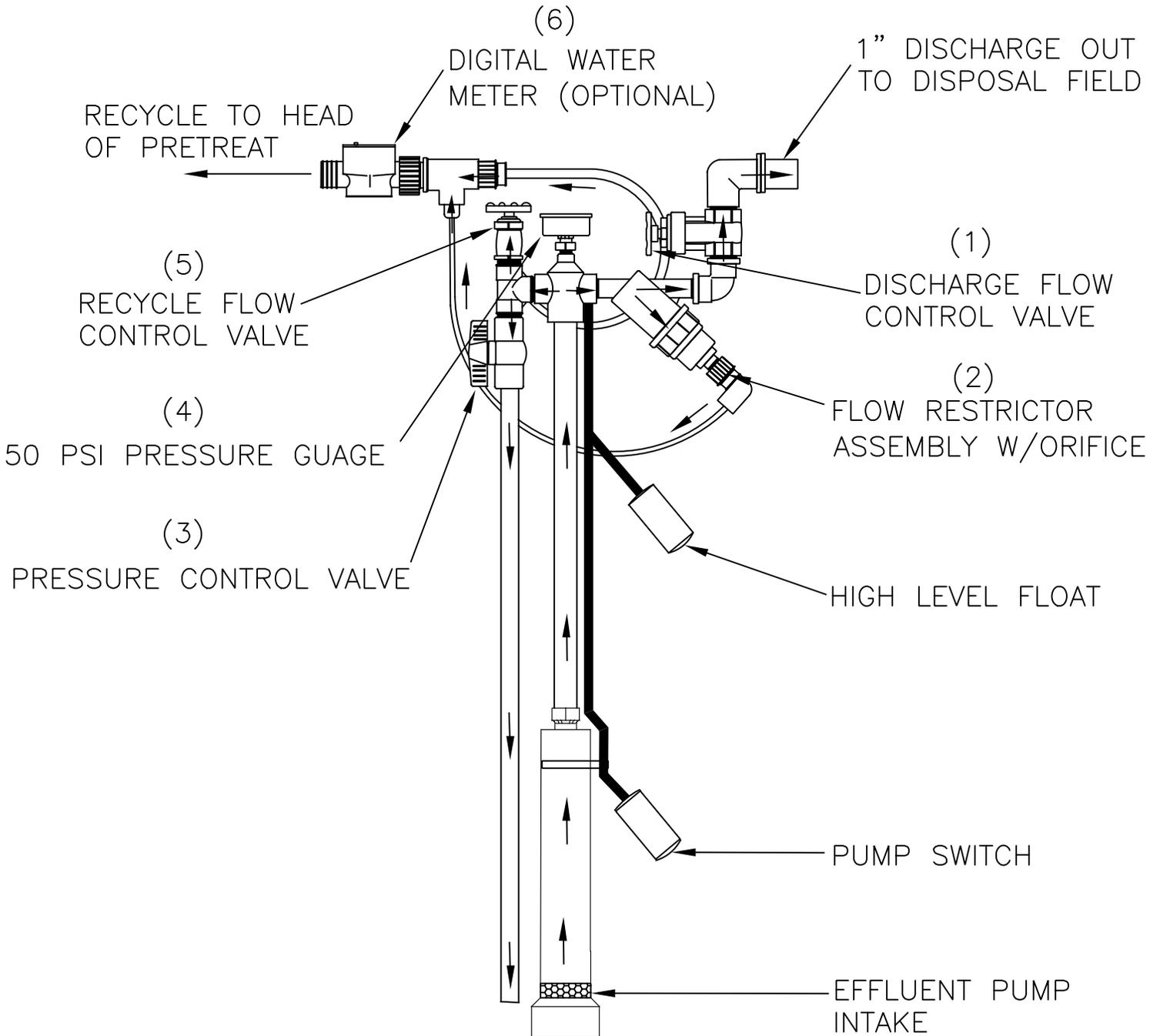
300gpd/12 cycles = 25gl per cycle

25gl dose/5gpm = 5 min PUMP ON

Set Clearstream Dosing Timer as follows:

Each Dosing cycle = 5 min PUMP ON with 1hr. 55 min PUMP OFF.

NOTE:
 DRIP IRRIGATION FIELD FLUSH
 IF USED IS RETURNED TO THE
 PUMP TANK.



DRAWING B

