

Pump Descriptions

Electric Diaphragm or Dual Electric Diaphragm

Reasons to use it

- Low cost \$ (\$150-350 for single pump, \$450 for PWM driver)
- Can be a very simple system

Reasons to not use it

- Generally a less durable pumping system
- Reduced pump life when regularly used at high PWM
- Pump can struggle to prime itself if there are long pulls from the tank
- NOT compatible with vApplyBase system

Requirements

- MUST be a "bypass" pump - do NOT use "demand" pumps if PWM controlled
- If you want the 20|20 to control the pump you must also purchase a PWM electric motor driver, adding cost to the system (example: MicroTrak P/N 18385, available at dultmeier.com)
- May require additional electrical generation capacity

Recommendations

- Generally application rate of 5 GPA maximum, 16r planter or smaller
- Size at 50-60% of the open flow rating of the pump
- Use lower operating pressures (20-30 psi)
- Not for higher flow requirements
- Single pump is generally capable of 1-3.5 GPM (in-furrow on 12r and smaller)
- Dual pumps are generally capable of 2-6 GPM (in-furrow on 16r and smaller)

Installation Considerations

- Mount the pump relatively close to the tank (within 10')
- Best if the pump is mounted below the outlet of the tank
- May require additional electrical generation capacity, can require up to 25 amps per pump, see manufacturer specifications

Examples

- Remco FatBoy 5538-2I1-94A
- AgXcel
- Schaffert
- PWM controller - MicroTrak 18385

Hydraulic Centrifugal pump

Reasons to use it

- Low Cost \$\$ (\$800-2000 with motor and needle valve, \$3000-3500 with motor and PWM valve)
- It can be setup for 20|20 control with a PWM control, or single set speed by SCV flow
- This pump set by SCV flow is a very simple system

Reasons to not use it

- Generally not a durable pump
- **Pump damage WILL result if the pump runs dry** - can be less than 15 seconds (new wet seal pumps are available to avoid this, at higher cost)
- Pump will NOT prime itself or draw well from a distance, it MUST be mounted directly below the tank
- Dual tank systems can be difficult to locate the pump enough below the tank and supply sufficient flow to the pump

Requirements

- Mounting MUST be directly below the tank
- Sizing of the pump and hydraulic motor must be done in accordance with the system pressure that is needed, see manufacturer specifications

Recommendations

- Hydraulic need will vary based on the size of the pump and motor, smaller pumps are 4-6GPM, larger pumps can be 15+ GPM of hydraulic demand
- Small models can supply up to 15 GPM of flow(in-furrow applications)
- Medium size models can supply 80 GPM
- Large models can supply 150 GPM (high nitrogen rates at high speed on large planters)

Installation considerations

- Mounting MUST be directly below the tank
- Generally the pressure relief bypass hose needs to go back to tank, returning to pump inlet can cause priming issues

Examples

- ACE pump
- Hypro 9313CU-M04, 9313CU-M08

Hydraulic Diaphragm

Reasons to use it

- Many times the best option, versatile
- Generally considered durable
- Primes well - can draw longer distances from the tank or dual tanks
- Precision Planting offers the "Pumpstack" with three sizes available
- AgXcel offers a direct drive model with built in shaft speed sensor for use with vApplyBase systems

Reasons to not use it

- Higher cost \$\$\$\$\$, one of the most expensive options (\$4000-7000)

Requirements

- Tractor must have enough hydraulic capacity, can be 10+ GPM of hydraulic need for large models

Recommendations

- Small models are 0.5-11 GPM (in-furrow application)
- Large models are up to 55 GPM (nitrogen applications)
- Running these pumps at 100% of rated capacity may cause reduced lifespan
- If pump is ran higher than rated maximum RPM damage may result
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Examples

- Precision Planting Pumpstack PP21, PP31, PP48
- AgXcel LFP80, LFP160, D250
- SureFire

Ground Drive Piston

Reasons to use it

- No hydraulic need, use when the tractor could have issues with not enough hydraulic flow for the planter
- Generally considered durable
- Primes well - can draw longer distances from the tank or dual tanks

Reasons to not use it

- Higher cost \$\$\$ (Pump without brackets and drive is \$1500-\$2800)
- Pump flow is set for a given planter speed, this can limit the application rate range
- Can have pressure fluctuations if pump stroke is long or pump speed is low
- Cannot perform health checks in the shop so the first pass of planting could be the first test of the system

Requirements

- No special requirements

Recommendations

- Make sure the pump is sized properly for the system need. A pump that is oversized can cause issues with pressure instability and difficulty in the vApplyHD hitting the rate.
- Small piston - 0.5-10 GPM (in-furrow application)
- Large piston - 68 GPM max (nitrogen applications)
- Running these pumps at 100% of rated capacity may cause reduced lifespan, if pump is ran higher than rated maximum RPM damage may result

Installation Considerations

- Can use an old seeding motor to convert the pump from ground to hydraulic drive allowing for vApplyBase use or ability to test in the shop for vApplyHD systems

Examples

- John Blue NGP-4050, NGP-5050, NGP-6050, NGP-7050, NGP-8050, NGP-9050

Hydraulic Drive Piston

Reasons to use it

- Generally considered durable
- Primes well - can draw longer distances from the tank or dual tanks

Reasons to not use it

- Higher cost \$\$\$\$, one of the more expensive options (\$2800-\$5000)
- Can have pressure fluctuations if pump stroke is long or pump speed is low
- Many direct driven models are not able to be adjusted for stroke length, this can result in more pressure instability and as such they are generally not recommended.

Requirements

- Tractor must have enough hydraulic capacity, can be 10+ GPM of hydraulic need

Recommendations

- Small piston - .5-10 GPM (in-furrow application)
- Large piston - 68 GPM max (nitrogen applications)
- Running these pumps at 100% of rated capacity may cause reduced lifespan
- If pump is ran higher than rated maximum RPM damage may result

Installation Considerations

- No special considerations

Examples

- John Blue NGP-4050, NGP-5050, NGP-6050, NGP-7050, NGP-8050, NGP-9050
- Note: The direct drive models remove the ability to adjust the stroke of the pump resulting in less flexibility and more pressure fluctuation. They also have high hydraulic supply requirements. Direct drive models do not have a shaft speed sensor and therefore are NOT compatible with vApplyBase.

Recommendation by flow rate (rates given below are the total demand of the planter)

To calculate the GPM requirement:

- $\text{GPM per row} = (\text{GPA} \times \text{row spacing} \times \text{max speed}) / 5940$
- $\text{GPM for the planter} = (\text{GPM per row}) \times (\# \text{ of rows})$
- Green highlighted options are generally good choices

Low flow rates - 2 GPM or less

Example: 5GPA up to 16r planter @5mph

- Electric Diaphragm (or dual electric pumps up to 3 GPM)
- Small Centrifugal
- Small Hydraulic Diaphragm

DO NOT USE

- Oversized pumps - ie. large centrifugal, large piston, large diaphragm

Medium flow rates - 2 GPM to 10 GPM

Example: 5GPA-15 GPA on 12r high speed; 8GPA on 24r planter high speed

- Small Centrifugal
- Small Piston pump (ground drive or hydraulic drive)
- Small Hydraulic Diaphragm

High flow rates - 10-40 GPM

Example: 25 GPA on 24r planter

- Medium size Hydraulic Centrifugal
- Hydraulic Diaphragm
- Piston pump (ground drive or hydraulic drive)

Very High flow rates 40-60 GPA (50-100 GPM)

- Large Hydraulic Centrifugal pump
 - Make sure to size for the pressure you are going to run at - may need higher pressures (80+psi) for dual band Conceal at these rates

DO NOT USE

- Generally other pump types are not recommended as they will be running at their top RPM range and may have reduced lifespan

Pump recommendation based on tank location

Tank mounted on front of tractor

- Piston pump (ground drive or hydraulic drive)
- Hydraulic Diaphragm
- Electric Diaphragm (if low GPM needed)
 - Mounted with the tank at front of the tractor

Saddle tanks mounted on tractor

- Piston pump (ground drive or hydraulic drive)
- Hydraulic Diaphragm
- Possible Hydraulic Centrifugal
 - This option can be tricky, must be low enough AND large enough supply line to gravity feed the full output volume of the pump

Center mounted tank on planter frame

- Hydraulic Centrifugal
 - Mounted directly below tank
- Piston pump (ground drive or hydraulic drive)
- Hydraulic Diaphragm
- Electric Diaphragm (if low GPM needed)
 - Mount close to the tank

Dual tanks on wings of planter

- Hydraulic Diaphragm
- Piston pump (ground drive or hydraulic drive)

Towed carts

- Hydraulic Centrifugal
 - Mounted below tank on cart
- Piston pump (ground drive or hydraulic drive)
- Hydraulic Diaphragm

Tank location and number of tanks (green highlighted options are generally a good choice)

	Center mounted on planter frame (or single tank on bar)	Dual Tanks on Planter Wings	Saddle Tanks on Tractor	Front Mounted Tractor Tank	Towed Cart
2 GPM or less (maybe 3 GPM - 5 GPA on 24r with Dual electric pumps)	Electric Diaphragm Small Hydraulic Diaphragm Small Centrifugal (directly below tank)	Small Hydraulic Diaphragm	Small Hydraulic Diaphragm	Electric Diaphragm Small Hydraulic Diaphragm	Small Hydraulic Diaphragm
2-10GPM	Small Hydraulic Diaphragm Small Piston (ground or hyd. drive) Small Centrifugal (directly below tank)	Small Hydraulic Diaphragm Small Piston (ground or hyd. drive)	Small Hydraulic Diaphragm Small Piston (ground or hyd. drive)	Small Hydraulic Diaphragm Small Piston (ground or hyd. drive)	Small Hydraulic Diaphragm Small Piston (ground or hyd. drive) Small Centrifugal (directly below tank)
10-45 GPM	Hydraulic Diaphragm pump Piston pump (ground or hyd. drive) Centrifugal pump (directly below tank)	Hydraulic Diaphragm pump Piston pump (ground or hyd. drive)	Hydraulic Diaphragm pump Piston pump (ground or hyd. drive)	Hydraulic Diaphragm pump Piston pump (ground or hyd. drive)	Hydraulic Diaphragm pump Centrifugal pump (directly below tank)
45-100 GPM	Centrifugal pump (directly below tank)	Possibly two pumps	Possibly two pumps	Unlikely scenario	Centrifugal pump (directly below tank)

Flow Rate needed

Example pumps - not an endorsement of any of these options		
Description	Model	Flow output
Electric	Remco FatBoy 5538-211-94A	1-3 GPM Single pump @ 50-30PSI
Small Centrifugal	HyPro 9313CU-M04	0-29 GPM @ 70psi, 36-64GPM @ 50psi, 60-83 GPM @40psi.
Small Hydraulic Diaphragm	PP21 pumpstack	1-13 GPM
Hydraulic Diaphragm	PP31 pumpstack	2-20 GPM
Hydraulic Diaphragm	PP48 pumpstack	5-31 GPM
Large hydraulic diaphragm	AgXcel D250	20-55GPM
Hydraulic Centrifugal -large	HyPro 9313CU-M08	48-89 GPM @ 90 psi
Hydraulic Centrifugal -large	HyPro 9313CU-M10	68-132 GPM @90psi

Note: direct drive piston pumps while compatible provide the most challenges with pressure fluxuation.