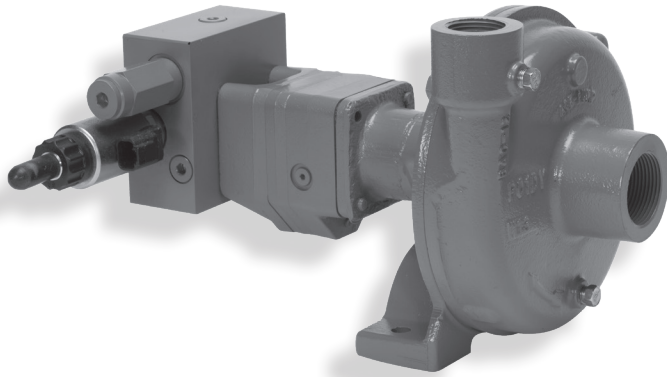




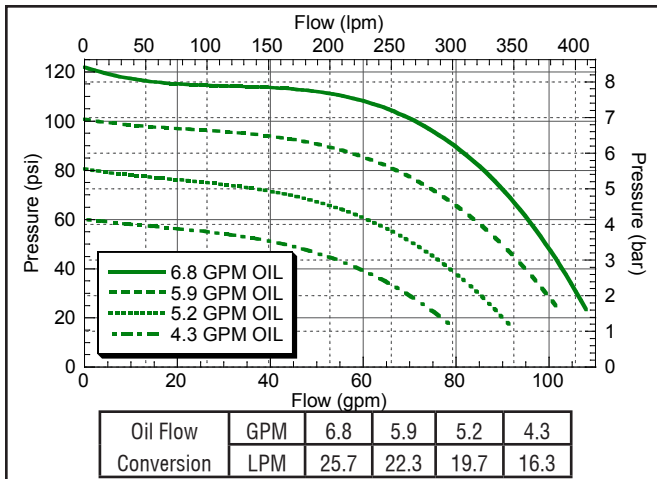
# Hydraulic Driven Pump with Integrated PWM Control Valve

## FMCS-C-HYD-206-PWM

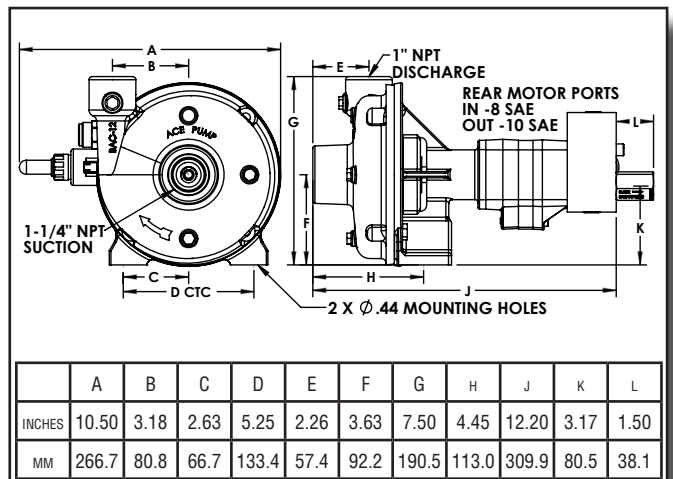


- Suction 1-1/4" NPT x Discharge 1" NPT
- Integrated Proportional 12V Control Valve for Precision Ag Applications Using Pulse Width Modulated (PWM) Control Signals
- Integrated Pressure Relief Valve Prevents Overspeeding
- For the following Hydraulic Systems:
  - ✓ Pressure Compensating Closed Center
  - ✓ Load Sensing or Pressure Flow Compensating Closed Center
- Severe Duty Silicon Carbide Mechanical Seal
- Chemical Resistant Thermoplastic Impeller

## PERFORMANCE CHART

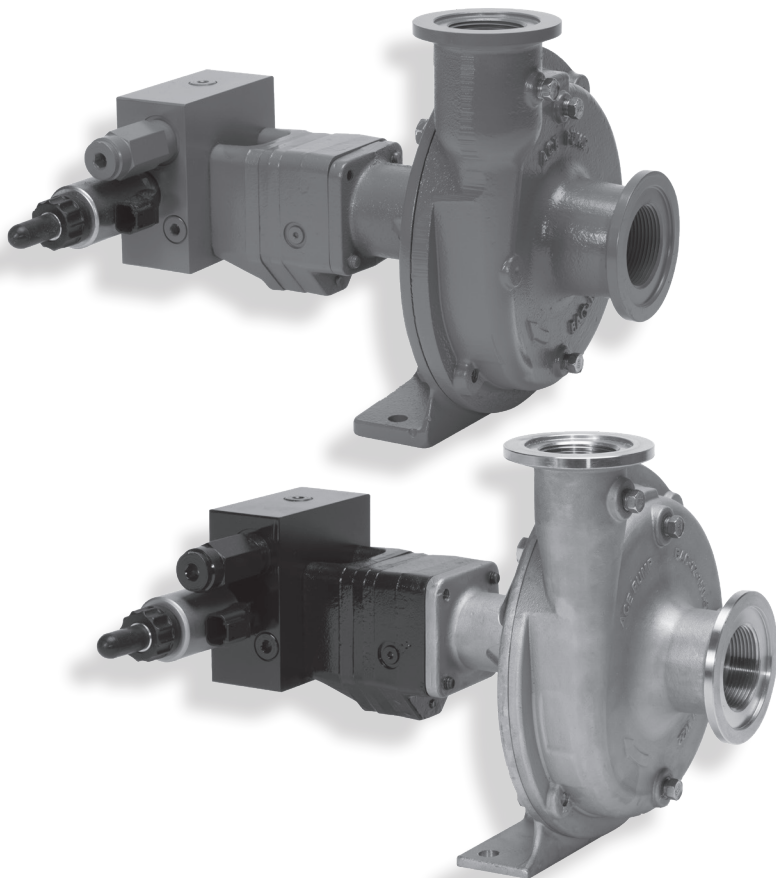


## DIMENSIONS





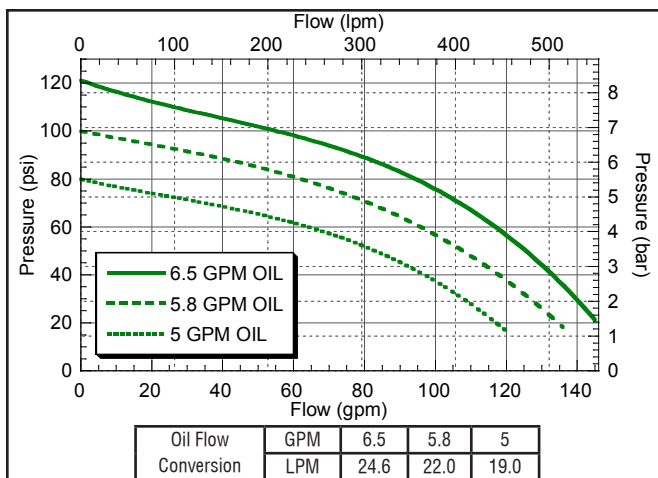
# Hydraulic Driven Pump with Integrated PWM Control Valve



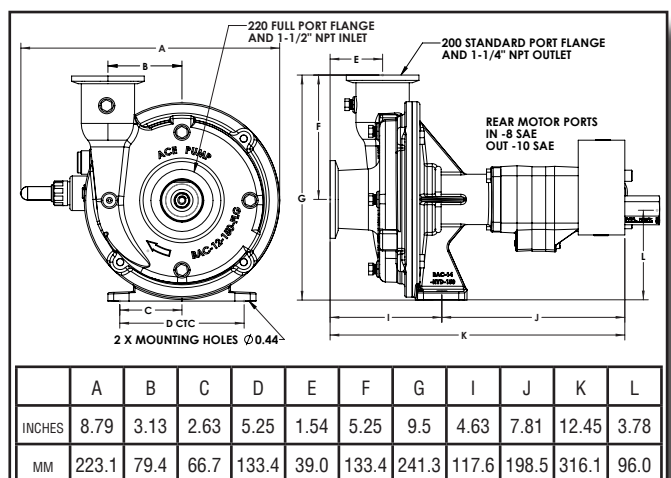
## FMCSC-150F-HYD-206-PWM FMCSC-150FS-HYD-206-PWM

- Suction 220 Flange & 1-1/2" NPT
- Discharge 200 Flange & 1-1/4" NPT
- -FS Model - 316 Stainless Steel
- Integrated Proportional 12V Control Valve for Precision Ag applications using Pulse Width Modulated (PWM) control signals
- Integrated Pressure Relief Valve prevents overspeeding
- For the following Hydraulic Systems:
  - ✓ Pressure Compensating Closed Center
  - ✓ Load Sensing or Pressure Flow Compensating Closed Center
- Severe Duty Silicon Carbide Mechanical Seal
- Chemical Resistant Thermoplastic Impeller

## PERFORMANCE CHART



## DIMENSIONS



# REGULATING HYDRAULIC FLOW TO THE SPRAYER PUMP

There are three general types of hydraulic systems:

- 1) Load Sensing (LS), also known as Pressure-Flow Compensating (PFC) Closed Center
- 2) Pressure Compensating Closed Center (PC)
- 3) Open Center (OPEN)

This product is designed to operate on both Closed Center Hydraulic Systems. It should not be used with Open Center systems. Please consult the Tractor Hydraulic System Pump Selection Guide(HSG), Internet Hydraulic Selection Guide (IHSG) at [www.AcePumps.com](http://www.AcePumps.com), or your tractor dealer to determine your tractor's hydraulic system.

The two valve design limits the maximum oil flow to the motor and prevents overspeeding. So the Restrictor Orifice and Flow Limiter are not needed with this product.

All PWM controllers are slightly different in the terminology used and setup procedures. Please consult your controller documentation or their technical service department for additional assistance with your specific application and implement in use.

Link to Ace Pump  
IHSG


<http://www.acepumps.com/ihsg/>




Link to Ace Pump  
PWM Technical File

[http://www.acepumps.com/\\_Assets/Literature/PWM\\_Technical\\_File.pdf](http://www.acepumps.com/_Assets/Literature/PWM_Technical_File.pdf)






















HSG Homepage  
ACE Pumps Website




## Internet Hydraulic Selection Guide

Simply select a tractor make on this page and the model number from the following page. The system will then display which ACE pump models to use.

You may also choose to print the results of your search along with the setup instructions for your hydraulic system type.

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ACE PUMP CORPORATION  
P.O. Box 13187 • 1650 Channel Avenue • Memphis, TN 38113  
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## PWM Technical File

Updated 12/2015

### PWM Control Basics and Terminology

**PWM (Pulse Width Modulated)** control systems are being used widely in modern liquid applications. The use of this technology is driven by the need in agriculture for precision application of fertilizers and chemicals. The goal is to apply what is needed at the correct time while minimizing input cost, preventing runoff which may contaminate water supplies, and eliminate drift.

The PWM signal is an efficient technique to control current to a proportional electrical hydraulic valve. The PWM signal switches on and off to achieve the required control current (see Figure 1). The duty cycle "D" refers to the "on" portion of the cycle. The duty cycle can be anywhere from 0 (signal always off) to 1 (signal always on).

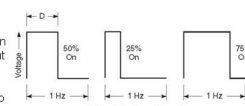


Figure 1

**Dither** is a rapid, small variation in the control signal designed to keep the valve spool in motion. This movement is intended to avoid **stiction** and average out **hysteresis**.

**Stiction** keeps the valve spool from moving when control signal changes are small. When the valve spool finally moves it can overshoot the correct position.

**Hysteresis** is the tendency for the spool movement to be different if the signal is increasing or decreasing. This can happen even with the identical control signal.

### Valve Settings & Performance

**I-Min or Minimum PWM** is the minimum control current induced into the control valve. This is typically set to the point where the control signal creates a response from the valve spool. For Ace Pumps, this is typically set to the point when our pump starts to turn or where a minimum application pressure is achieved. This eliminates the **Deadband** which is typical for all control valves (see Figure 2).

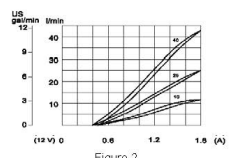


Figure 2  
Typical Valve Performance Graph

**I-Max or Maximum PWM** is the maximum control current supplied to the control valve. This is typically set to the point where the control signal results in maximum performance. For Ace Pumps, set this to achieve the maximum shut-off pressure recommended for the pump model.

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