

PumpMate™ 2000

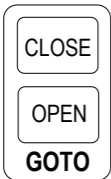
# **PVC Option Guide**

(Proportional Valve Control)  
Patent Pending

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# Manual CLOSE / OPEN



The manual CLOSE and OPEN override keys perform the normal valve control operation of fully shutting or fully opening the motor valve.

With the PVC option active, pressing the GOTO OPEN key initiates a full open motor valve command and also starts the CHECK time timeout. When the CHECK timeout expires, the PVC option interrupts the motor valve operation and performs a close or open motor valve adjustment and then a “hold” command to maintain the current gas flow through the motor valve.

*CHECK time starts with GOTO OPEN*

*Controls gas chart spiking*

This OPEN command sequence is very important in association with plunger lift operation. At the beginning of the OPEN cycle, the rate of motor valve opening is high to get the plunger and liquids moving. The PVC will then take control to limit the maximum gas flow rate and prevent the commonly seen gas chart spiking effect.

*PVC is only active in the flow cycle*

The PVC control feature is only active during the flow or OPEN cycle. Pressing GOTO CLOSE will turn off the PVC feature and fully close the motor valve. All the standard on/off sensor controls that manage the OPEN and CLOSE cycle timing may be used with PVC control.

# VALVE 1/10s

**TIME**

**OFF**

**ON**

*Motor Valve  
adjustment  
amount*

*Use Grey  
SET keys  
to enter*

*VALVE  
1/10 sec  
entry*

The VALVE 1/10s setting controls the motor valve adjustment duration in one tenth (1/10) second time increments.

The yellow TIME ON key is used to enter the amount of motor valve adjustment. Press the yellow TIME ON key until "VALVE 1/10s" is displayed.

Use the gray SET keys to set the valve adjust amount. The max adjust increment is 60 or 6 seconds..

**SET**

**+ -**  
**PAGE**

**HRS**  
x100

**MIN**  
x10

**SEC**  
x1

**SET**

CYCLE BATTERY VDC

V1  
V2

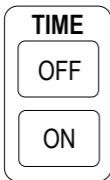
**\*VALVE**  
**1/10s+**

**15**

FUNCTION HRS MIN SEC

The motor valve diaphragm size and the supply gas pressure determine the amount of motor valve stem movement for a specific valve adjust time increment. It is important to set the VALVE 1/10s setting to not over or under adjust based on well flow performance.

# Sale InH2O



Use TIME  
ON to set  
the InH2O

Use Grey  
SET keys  
to adjust

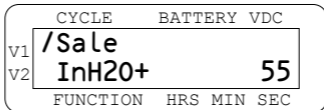
The sale set point is used with the PVC option and a DP transmitter to set the desired motor valve flow rate to be maintained.

The yellow TIME ON key is used to enter the PVC control set point in InH2O. Press the yellow TIME ON key until "Sale InH2O" is displayed.

Use the grey SET keys to adjust the DP transmitter's set point to the desired motor valve flow rate in InH2O.

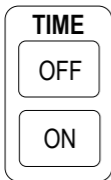


PVC flow  
set point  
entry



The PVC option uses the numeric set point entry to establish the motor valve flow rate to be maintained. Setting the Sale InH2O set point to zero (0) will disable the PVC action and change the motor valve control to the standard full open and close operation.

# CHECK TIME



\* Flow is within 10% of set point

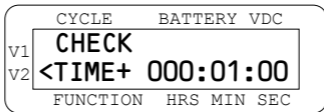
> Flow is greater than set point

< Flow is less than set point

The CHECK time controls how often the flow rate is checked to determine if a motor valve adjustment is needed to maintain flow.

The yellow TIME ON key is used to enter the CHECK time in hrs, min and sec. Press the yellow TIME ON key until "CHECK TIME" is displayed.

Use the gray SET keys to enter the desired CHECK time's sample period. Minimum CHECK time is 1 second.



Frequent or continuous motor valve adjustments are a signal that CHECK and/or VALVE are set too low. Setting the CHECK time to zero (000:00:00) will disable the PVC action and change the motor valve control to the standard full open and close operation.

# PVC Invert Option

The PVC Invert Option (Advanced Option – 3) is used to invert the standard Inversely Proportional motor valve control mode to operate in a Proportional motor valve control mode. This is particularly useful if the DP flow transmitter is located on a different flow line than the flow line that is directly in the motor valve's flow stream. The Flow Rate Control (FRC) application is one example where proportional motor valve control is required. A second example may be where chemicals are injected through the motor valve in proportion to flow rate.

## PVC Display Indicators

The PVC option activates various display indicators to provide a visual indication of what actions the PVC is taking in response to changes in the measured flow rate. These action indicators are displayed in the LCD to and bottom row's left most character positions.

- / Valve full open action.
- | Valve full close action.
- \* Flow within 10% of set point.  
OK – No adjustment needed.
- < Flow is less than set point.  
Adjust motor valve flow.
- > Flow is greater than set point.  
Adjust motor valve flow.

# Flow Rate Control

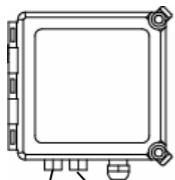
Flow Rate Control (FRC) is typically used where gas is continuously produced out of the annulus or casing and the fluids are unloaded through the tubing. In this gas well application, a specific gas flow velocity in the tubing is required to effectively carry the fluids up the well and out through the tubing. The PVC option presents an effective method of monitoring the tubing gas flow rate and, using a motor valve on the annulus, to restrict gas flow out of the annulus to increase the flow rate in the tubing, or to increase the flow rate out of the annulus to decrease the flow rate in the tubing as required to maintain a specific tubing gas flow velocity.

To implement the FRC application, the PumpMate 2000 is configured as an ON / OFF timer with the LP and HP options enabled to allow setting the OPEN cycle time or the CLOSE cycle time, or both, to zero time which acts to disable the timing function and operate the well as a continuously flowing well. When setting the OPEN time or the CLOSE time to zero, the PumpMate 2000 will show the LCD message "PSI ONLY!" to indicate that the timing function is disabled.

The PVC Invert option is also activated to allow motor valve control that is directly proportional to the flow rate set point deviation. When the tubing flow rate is high, the annulus flow is increased and, conversely, when tubing flow rate is low, annulus flow rate is decreased. Always ask for FRC when ordering PumpMates for this application.

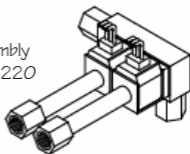
# Minimum Configuration

The minimum configuration required to use the PVC option includes the PumpMate 2000 controller with 2-Valve assembly and a DP transmitter.



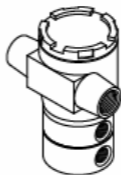
PumpMate 2000  
9206-2061000

2-Valve Assembly  
9206-2062220



Vent from  
Motor Valve

Gas Out to  
Motor Valve



DP Transmitter  
5520-5450276

The PVC option is only available with microprocessor program versions 4.2 (v4.3) and higher. Even though the 2-Valve assembly is required for PVC operation, the PVC feature overrides and disables all the 2<sup>nd</sup> MV related options, including:

TANK wait, TANK TIME, TANK SKIP, PURGE TIME, PURGE Invert, V1 ON and BakUp Equalize options.