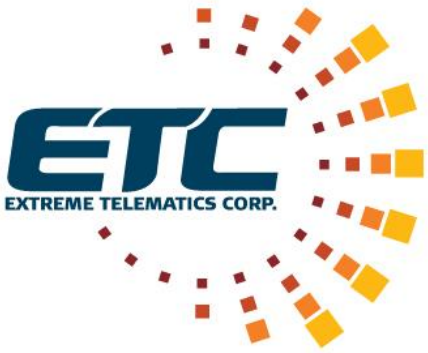
Application Note – Sasquatch Plunger Velocity Sensor

Integration Guide for Production Manager Well Optimization and ROC controllers



Revision 1

July 11, 2016

NOTICE OF CONFIDENTIALITY AND NONDISCLOSURE

Revision History

Revision	Date	Author	Changes
1	11 July 2016	Valens D'Silva	Initial Version

Acronyms

PMWO	**Production Manager Well Optimization**
PMSC	**Production Manager Surface Controls**
AB	**Action Block**

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1 Introduction

1.1 Overview

Sasquatch Plunger Velocity Sensor ("Sasquatch") is the next state in the evolution of plunger detection. Sasquatch will measure the surface velocity of the plunger in addition to detection the plunger arrival.

Production Manager Well Optimization ("PMWO") is an advanced user program for the designed to maximize production from oil and gas wells. The program is intended for either the ROC800-Series Remote Operations Controller or the FloBoss™ 107 Flow Manager.

1.2 Purpose

This application note will detail the device setup so PMWO can communicate with Sasquatch. Additional configuration to retrieve and store the surface velocity in PMWO's logging features will be described in later sections.

2 Device Setup and Configuration

Connect both terminals on Sasquatch to the controller. The Signal pin on Sasquatch should be connected to a Digital Input on the controller. Sasquatch's Signal pin acts as a dry contact so the input on the controller could require a pullup resistor. Refer to the user manual for the controller.

The COM1 port must be connected to a RS485 capable port on the controller. Refer to the Sasquatch User Manual and the appropriate manual for the controller.

2.1 Communication Port Configuration

The default communication port configuration is shown in the figure below.

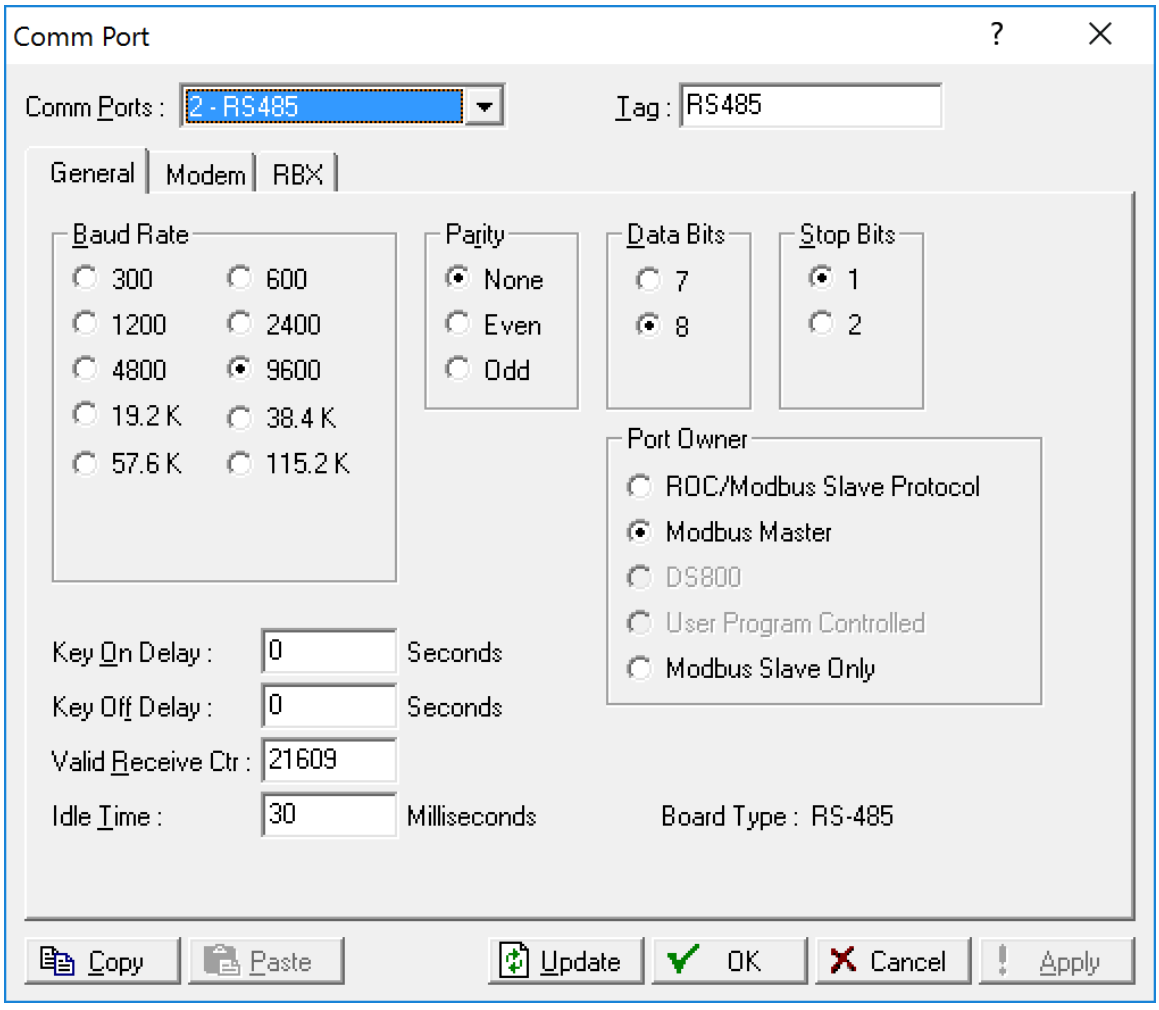

Figure 1: Communication Port Setup

2.2 Modbus Setup

The following figures detail the Modbus Configuration

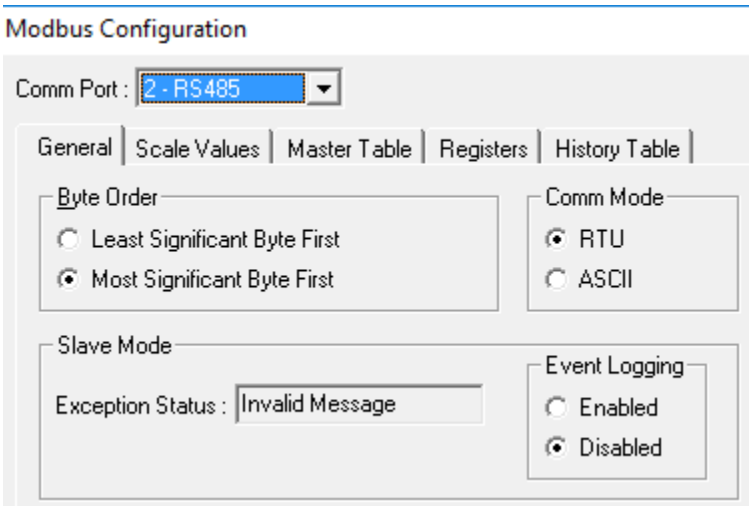

Figure 2: Modbus Configuration - Byte Order

At least three registers should be configured as Soft Points in PMWO. They are

1. Plunger Velocity Log Surface Velocity Entry 1 (most recent plunger surface velocity)
    a. Register (Address) - 822 (821)
    b. Size – 16 bit (SHORT)
    c. Function Code – 4 (Read Input Register)
2. Plunger Velocity Log Velocity Confidence Code Entry 1 (most recent velocity confidence code)
    a. Register (Address) – 942 (941)
    b. Size – 16 bit (SHORT)
    c. Function Code – 4 (Read Input Register)
3. Units - for reporting plunger velocity
    a. Register (Address) – 5 (4)
    b. Size – Coil (BYTE)
    c. Function Code – 5 (Force Single Coil)
    d. Value – 0 (Imperial), 1 (Metric)

The following figure below shows the configuration for all the above items.

Modbus Configuration

Comm Port : 2 - RS485

General | Scale Values | Master Table | Registers | History Table

Logical Point : 1 - MastTbl 1 (RS485) Tag : MastTbl 1

	RTU Address	Function Code	Slave Register	Master Register	Number of Registers	Comm Status	Comm Status Text
1	1	4 - Read Input Registers	821	821	1	8	Valid Response
2	1	5 - Force Single Coil	4	4	1	8	Valid Response
3	1	4 - Read Input Registers	941	941	1	8	Valid Response

Figure 3 - Modbus Master Table

General | Scale Values | Master Table | Registers | History Table

Table : 1 Tag : Reg Map 1

Index	Start Register	End Register	Device Parameter(s)	Indexing	Conversion	Comm Port
1	821	821	ESFP 1, SHORT1	Point	0	All Comm Ports
2	4	4	ESFP 1, BYTE1	Point	0	All Comm Ports
3	941	941	ESFP 1, SHORT2	Point	0	All Comm Ports

Figure 4 - Modbus Registers

The Modbus Master Mode can be configured with the following timeout and retry settings.

Master Mode

Start Polling :

Starting Request : 1 Timeout : 1 Seconds

Number of Requests : 2 Retries : 1

Continuous Polling

Enabled

Disabled

Request Delay : 1.0 Seconds

Figure 5 - Modbus Master

3 Capturing Surface Velocity on Plunger Arrival

When Sasquatch is continuously powered it will monitor the plunger when it is rising and falling at the surface. Sasquatch can report a velocity in each case. Sasquatch can also measure plunger

velocity when the plunger is bouncing at the surface, depending on well conditions. Production Manager Surface Controls (PMSC) Action Blocks will be used to record the plunger velocity associated with when it first arrives at the surface.

3.1 PMSC Action Blocks

The Action Blocks (AB) should be configured to record the Modbus registers when both the following conditions are met:

1. The PMWO program is in the Lifting portion of the Cycle
2. Sasquatch sensor closes the switch

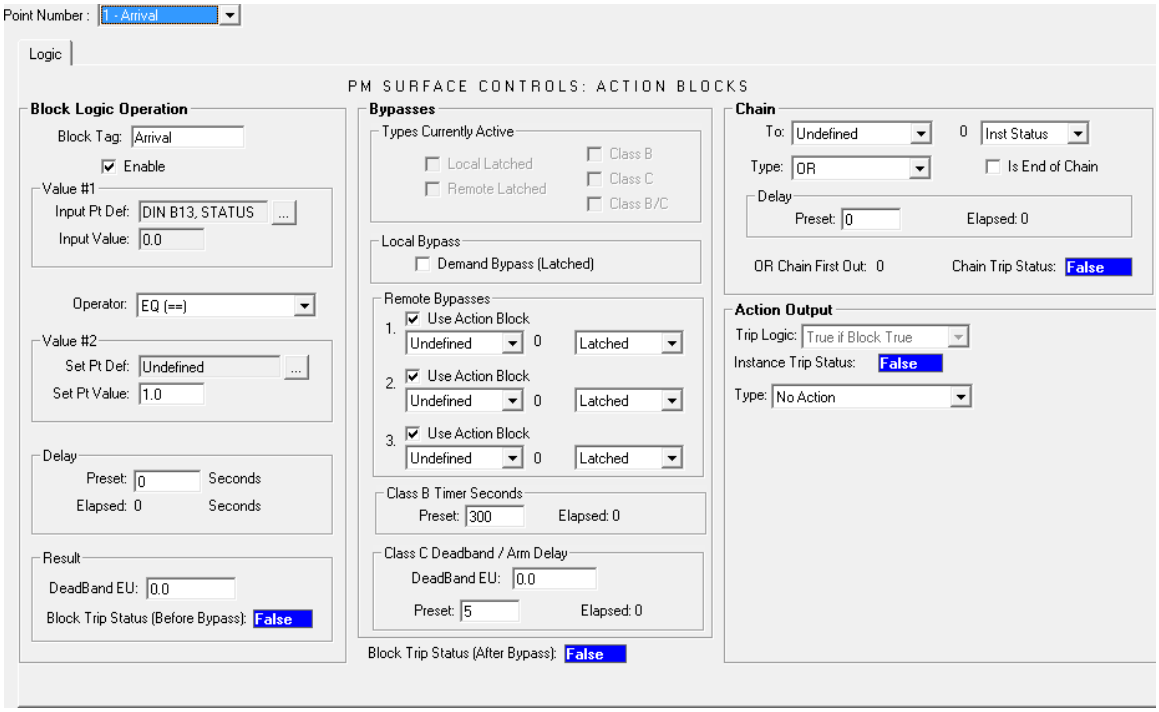

Figure 6 - Plunger Arrival Action Block

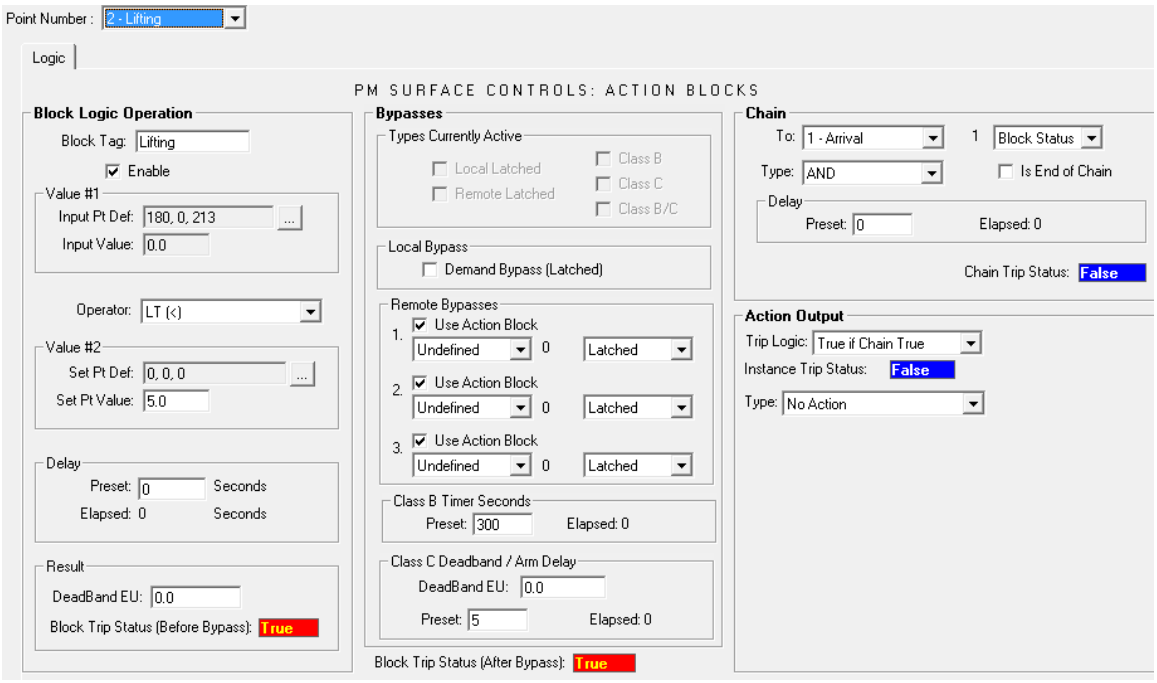

Figure 7 - Lifting Action Block

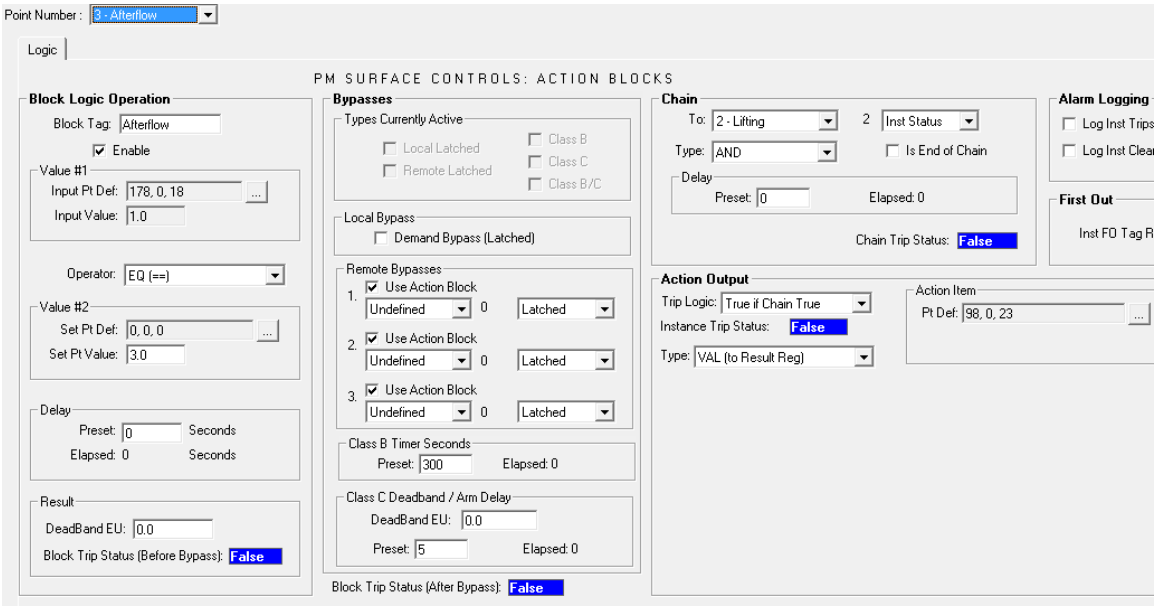

Figure 8 – Move Plunger Velocity Action Block

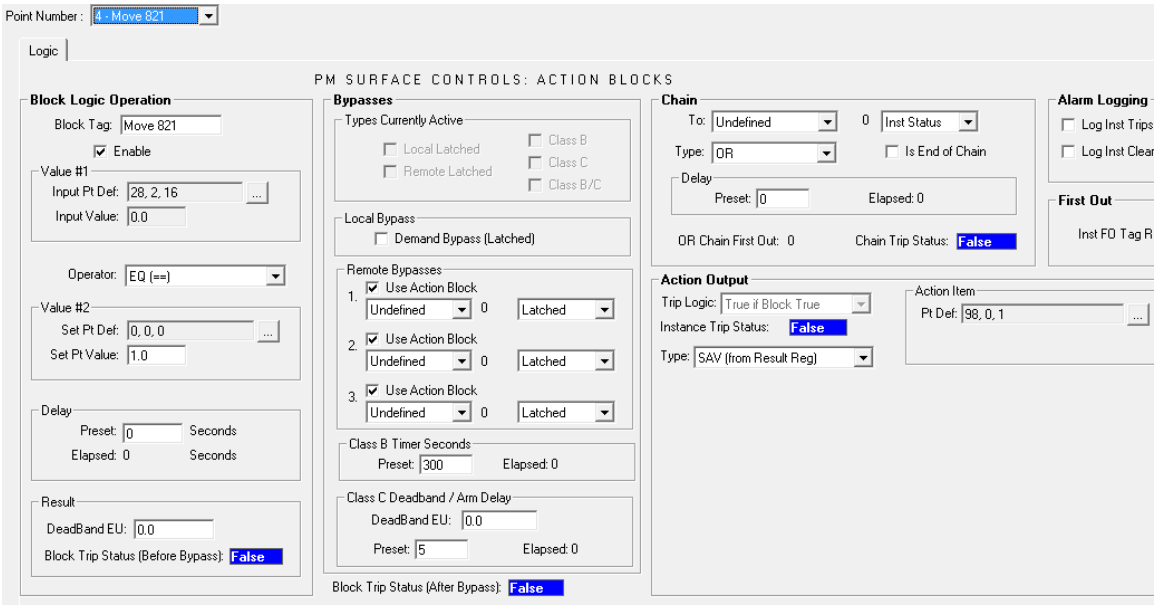

Figure 9 – Store Plunger Velocity Action Block

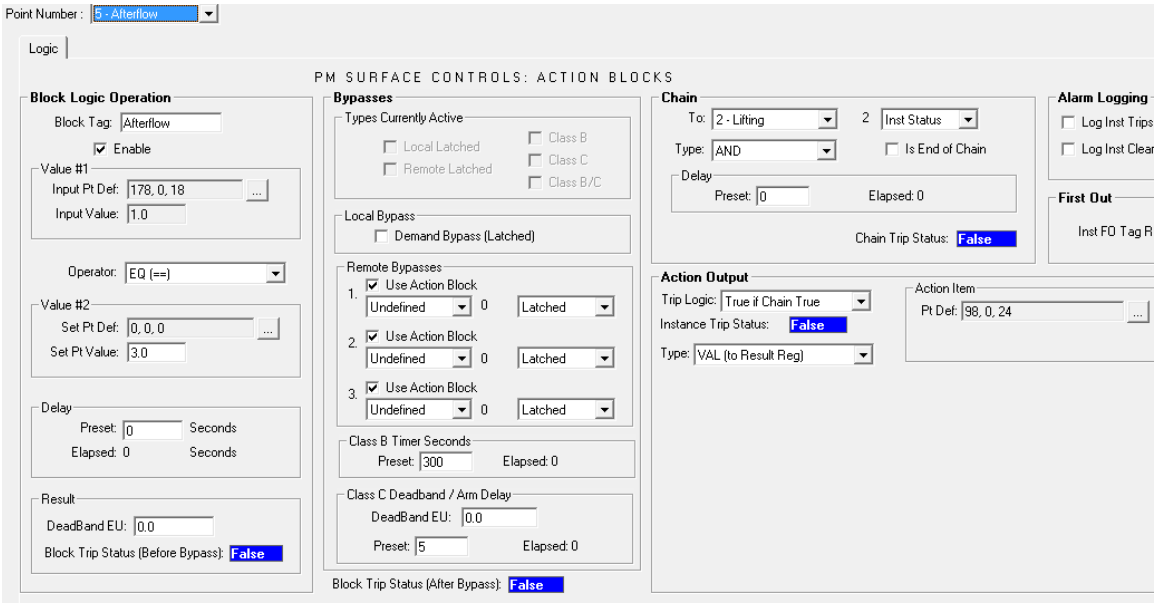

Figure 10 - Move Velocity Confidence Code Action Block

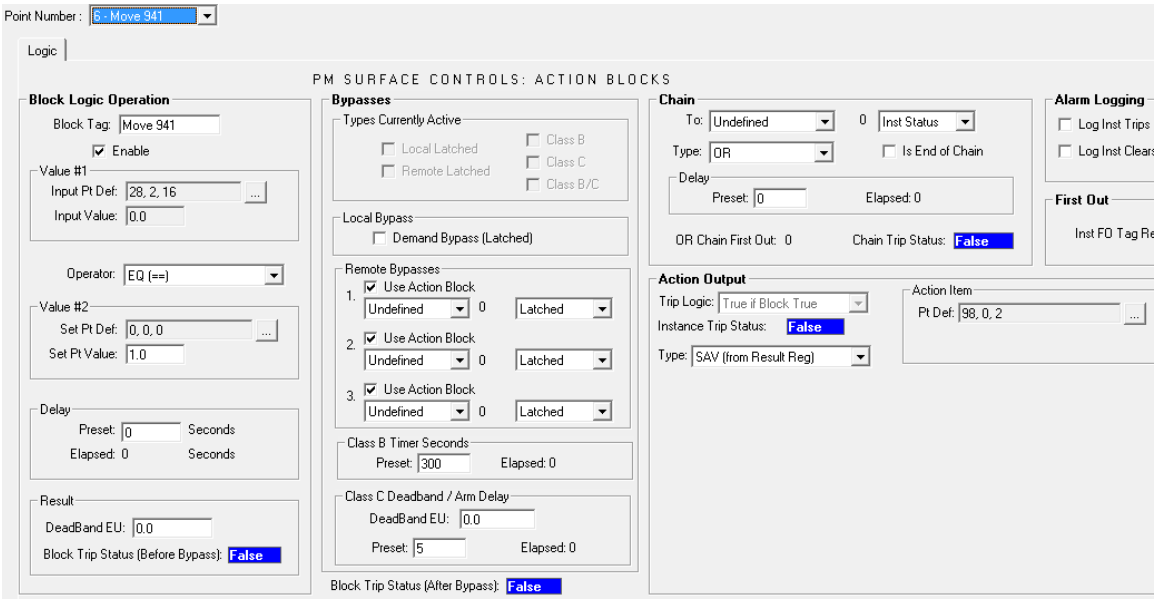

Figure 11 - Store Velocity Confidence Code Action Block

3.2 Adding Surface Velocity to Cycle Logs (PMWO version 4.03 and newer)

From PMWO version 4.03 and onwards users can store custom values in the Cycle Log. For those on older versions of PMWO the surface velocity can be stored to history instead. Refer to section 0.

Cycle Settings are in the PMWO Config display #80, under the General tab.

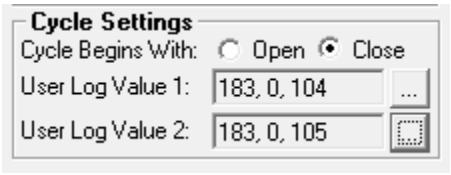

Figure 12 - Add User Values To Cycle Logs

User logged values are in the PMWO Units display #79, under the Cycle Logs tab.

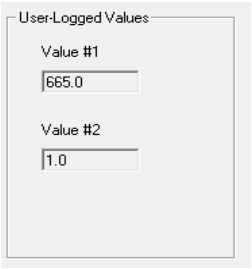

Figure 13 - User Logged Values

3.3 Adding Surface Velocity to History (PMWO version pre 4.03)

To write the surface velocity and velocity calculation code to history add the following two points.

Point	Archive Type	Archive Point
1	Current Value	183, 0, 104
2	Current Value	183, 0, 105
3	Undefined	0, 0, 0
4	Undefined	0, 0, 0
5	Undefined	0, 0, 0

Figure 14 - Archive Surface Velocity