Application Note – Sasquatch Plunger Velocity Sensor

Integration Guide for ABB Controllers



Revision 1

July 11, 2016

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Revision History

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

Acronyms

SCADA	Supervisory Control and Data Acquisition

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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.

ABB TotalFlow controllers including the XRC and XFC series are common wellsite RTU and flow measurement devices. PCCU is a software program that is the local interface to all ABB field products. PCCU enables one to: calibrate and configure all I/O; collect and view historical data files; perform diagnostics and troubleshooting; and program and monitor custom math and logic operations.

1.2 Purpose

This application note will detail the device setup so a compatible ABB Controller can communicate with Sasquatch using PCCU. The document will detail how Sasquatch can be integrated into a new controller application and an existing controller application.

2 New Controller Application Integration

If Sasquatch will be integrated into a new application on an ABB Controller it is recommended to use the configuration file (Sasquatch.xfc32) that can be found with this application note. The application will display the plunger surface velocity (current and previous arrivals), in a scrolling list, on the display.

The configuration file can be loaded using the 32bit Loader Application that is part of PCCU. For details on how to use the 32bit Loader Application please refer to the ABB website.

3 Existing Controller Application Integration

When integrating Sasquatch into an existing Controller Application Sasquatch must be configured as a generic COM device. After the device is configured the Modbus register Request Blocks must configured.

3.1 COM2 Device Setup

Sasquatch must be configured as a COM2 device. This can be found under the Communications tab.



Figure 1: COM2 Device

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- Totalflow - TCP		Description	Valua	
- Totalflow - USB	046	Port Name	Value COM2: Sasulatch	
- MMI Serial - COM0	533	Port		
- TF Remote - COM1	5.0.22	Port Type	OnReard Sarial	
COM2: Sasquatch	5.0.6	Protocol	Modew Kert (01)	
- Holding Kegisters	5.0.0	Paud Data		
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E-Flow Medsurement	5.U. 12	Register Format	IO DR MORICON	
- Analycic				
- Digital Outputs				
- No Flow				
-Adv Setup				
Speed of Sound				
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- Holding Registers				
Operations				

Figure 2: COM2 Setup

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- Iotalflow - ICP		Description	Value	
- IOTAITIOW - USB	5.0.1	Interface	R485	
- MMI Selidi - COMU	5.0.3	Data Bits	8	
	5.0.4	Parity	None	
-Holding Registers	5.0.5	Stop Bits	1	
⊕ I/O Interface	5.1.10	Response Delay	5	
E-Flow Measurement	5.1.1	Xmit Key Delay (milliseconds)	1	
Setup	5.1.2	Unkey Delay (milliseconds)	1	
Analysis	5.1.3	Timeout(milliseconds)	300	
Digital Outputs	5.0.13	Retries	0	
No Flow	5.0.17	Trailing Pad	None	
- Adv Setup	5.3.0	Directory	Comm-5Modbus	
- Speed of Sound	5.0.15	Switched V-Batt/Operate	Enable	
	5.0.19	Trace Logging	0	
Operations				

Figure 3: COM2 Advanced

3.2 Request Blocks

There are several sections of the Sasquatch Modbus Register map that must be configured by the Application. These are translated in several Request Blocks. The Request Block configuration have been provided in five files (.mrb) with this application note. The files can be loaded into the Application using PCCU. The figures below are to illustrate each of the Request Block's configurations.

When the Request Blocks are configured all the data from Sasquatch can be found under the Holding Registers. As a reference the velocity for the most recent plunger arrival is stored in 5.102.1 under the velocity log. This register can then be retrieved into the SCADA system under plunger history.



Figure 4: Request Blocks

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Communications	alput Register	Arrival Log Velocity Log Colls	s anput viscretes Capacity	-
- Totalflow - TCP		Description	U. M. Lui	_
- Totalflow - USB	5 100 0	Input Registers	0 Value	
- MMI Serial - COM0	5 100 1	Serial Number		-
F Remote - COM1	5 100 2	Serial Number	4	-
Holding Registers	5 100 3	Eirmware Version - Major	1	
E-I/O Interface	5 100 4	Firmware Version , Minor		-
E Flow Measurement	5.100.5	Firmware Version - Fix	2	-
Setup	5 100 6	Hardware Version	3	-
- Analysis	5.100.7	Reserved	0	-
- Digital Outputs	5.100.8	Reserved	0	-
- No Flow	5.100.9	Hardware Model	3	-
- Adv Setup	5.100.10	Product Variant	0	
- Speed of Sound	5.100.11	Sensor State (0 or 1)	2	-
Display Helding Registers	5.100.12	Dial Switch Setting (1-7)	7	-
Conceptions	5.100.13	Sensor Sensitivity Threshold	25	
E operations	5.100.14	Registers 14-100 (not used)	0	-
	5.100.15		0	
	5.100.16		0	-
	5.100.17	•	0	
	5.100.18		0	-
	5.100.19		0	
	5.100.20		0	
	5.100.21		0	
	5.100.22		0	
	5.100.23	•	0	
	5.100.24	•	0	
	5.100.25		0	
	5.100.26	•	0	
	5.100.27	•	0	
	5.100.28	•	0	
	5.100.29	•	0	
	5.100.30	-	0	
	5.100.31		0	-
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Figure 5: Input Registers



Figure 6: Arrival Log

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Communications	input Register	s Arrival Log Velocity Log Coll	input biscretes Capacity				
- Totalflow - TCP		Description		Value			
- Totalflow - USB	5 102 0	Plunger Velocity Log	0	Value			^â
- MMI Serial - COMO	5.102.1	Current Arrival Velocity	1789				
- IF Remote - COMI	5 102 2	Previous Arrival Velocity	0				
Holding Registers	5,102.3	Int16 3	1140				
Interface	5.102.4	Int16 4	0				
E Flow Measurement	5.102.5	Int16 5	1073				
Setup	5.102.6	Int16 6	764				
- Analysis	5.102.7	Int16 7	0				
- Digital Outputs	5.102.8	Int16 8	702				
-No Flow	5.102.9	Int16 9	492				
- Adv Setup	5.102.10	Int16 10	283				=
- Speed of Sound	5.102.11	Int16 11	0				
- Holding Registers	5.102.12	Int16 12	507				
Operations	5.102.13	Int16 13	0				
	5.102.14	Int16 14	0				
	5.102.15	Int16 15	50				
	5.102.16	Int16 16	1157				
	5.102.17	Int16 17	541				
	5.102.18	Int16 18	744				
	5.102.19	Int16 19	753				
	5.102.20	Int16 20	0				
	5.102.21	Int16 21	0				
	5.102.22	Int16 22	0				
	5.102.23	Int16 23	0				
	5.102.24	Int16 24	0				
	5.102.25	Int16 25	0				
	5.102.26	Int16 26	0				
	5.102.27	Int16 27	0				
	5.102.28	Int16 28	0				
	5.102.29	Int16 29	0				
	5.102.30	Int16 30	0				
	5.102.31	Int16 31	0				
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Figure 7: Velocity Log

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⊟-TOTALFLOW	Input Register	rs Arrival Lon Velocity Lon Coils	Inst Directory Canada
Communications	alput Negister	IS ATTAC LOG VERDUCY LOG	able oracies cohord
- Totalflow - TCP		Description	Value
- Totalflow - USB	5 103 0	Basic Control	Value Value
- MMI Serial - COM0	5 103 1	Restart Sensor	<u>-</u>
- IF Remote - COM1	5 103 2	Reset Velocity Log	a
Helding Pasisters	5 103 3	Reset Error Lon	a
- Holding Registers	5.103.5 E 103.4	Time Format	a
E Flow Measurement	5.103.5	Ilnite	a
Setun	5.103.5	Postart Modbus Interface	a
Analysis	5.103.0	Result moubus interface	v
- Digital Outputs	5.103.7	Reset Daily Statistics Log	۰ ۸
No Flow	5.103.0	Reset Modbus peripheral Error	۷ ۸
-Adv Setup	5.103.5	Las.	۰ ۸
Speed of Sound	5.103.10	Reset Anivar Log	۷
Display	5.103.11	Start Plunger Detection	0
- Holding Registers	5.103.12	Stop Plunger Detection	9
Operations			
	Re-read	Monitor	Print Screen Save Send Close Help XHr/p 🕷
Ready			#Polls: 31 #Errors: 0 Connected to TOTALFLOW Login: user

Figure 8: Coils

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-Communications	Input Registers Arrival Log Velocity Log Colls	s input uscretes Capacity	
- Totalflow - TCP	Development		
- Totalflow - USB	5 104.0 Input Discretes	o Value	
- MMI Serial - COM0	5 104 1 Date/Time Set (0 or 1)		
TF Remote - COM1	5.104.2 Percented (2.10)	· · · · · · · · · · · · · · · · · · ·	
COM2: Sasquatch	5 104 3 Reserved		
- Holding Registers	5 104.4 Reserved		
Elow Measurement	5 104 5 Reserved	0	
Setup	5 104.6 Received	0	
Analysis	5 104.7 Reserved		
- Digital Outputs	5 104.8 Reserved		
- No Flow	5 104.9 Reserved		
- Adv Setup	5 104 10 Reserved	0	
Speed of Sound	5 104 11 Plunger Arrival Status (0 or 1)		
Display	5 104 12 New Velocity Indicator (0 or 1)		
- Holding Registers			
	Re-read Monitor	Print Screen Save Send Close Help XHds @	1
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Ready		#Polls: 32 #Errors: 0 Connected to TOTALFLOW Login: user	

Figure 9: Input Discretes

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Communications	Input Registers	Arrival Log Velocity Lo	og Colls I	nput Discrete	is capacity		
- Totalflow - TCP		Description	Canacity	Type	Persistence	Name	Ш
- Totalflow - USB	5.144.255	Number of Arrays	5	1990	T CHURCHICC		ш
- MMI Serial - COM0	5.144.0	Array 1	50	Int16	Non-Persistent	Input Registers	ш
- IF Remote - COM1	5.144.1	Array 2	50	Int16	Non-Persistent	Arrival Log	ш
Holding Registers	5.144.2	Array 3	50	Int16	Non-Persistent	Velocity Log	ш
IVO Interface	5.144.3	Array 4	13	Int16	Non-Persistent	Coils	ш
Flow Measurement	5.144.4	Array 5	13	Int16	Non-Persistent	Input Discretes	ш
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- Analysis							H
- Digital Outputs							H
- No Flow							H
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Figure 10: Array List 7

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