# 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.

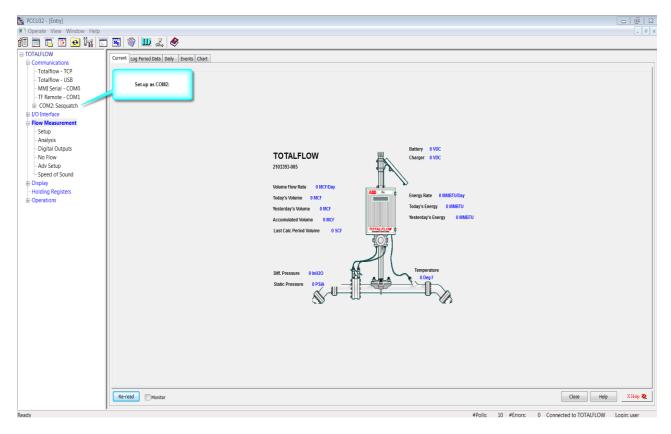


Figure 1: COM2 Device

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			1
- Totalflow - TCP		Description	Value
Totalflow - USB	0.4.6	Port Name	COIII2: Sasquatch
MMI Serial - COM0 TF Remote - COM1	5.3.3	Port	COM2:
COM2: Sasquatch	5.0.22	Port Type	OnBoard Serial
-Holding Registers	5.0.6	Protocol	Modbus Host (RTU)
I/O Interface	5.0.2	Baud Rate	900
Flow Measurement	5.0.12	Register Format	16 Bit Modicon
Setup			
Analysis			
Digital Outputs			
No Flow			
-Adv Setup			
Speed of Sound			
- Holding Registers			
Operations			

Figure 2: COM2 Setup

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<b>⊡</b> -TOTALFLOW	Setun Adv	anced Request Blocks Statistics	Parket Ion
Communications	Jetup	Request blocks Statistics	T Conce cog
- Totalflow - TCP		Description	Value
Totalflow - USB	5.0.1		Value Rs485
MMI Serial - COM0 TF Remote - COM1	5.0.3	Data Bits	8
COM2: Sasquatch	5.0.4	Parity	None
-Holding Registers	5.0.5	Stop Bits	1
I/O Interface	5.1.10	Response Delay	5
Flow Measurement	5.1.1	Xmit Key Delay (milliseconds)	1
Setup	5.1.2	Unkey Delay (milliseconds)	1
- Analysis	5.1.3	Timeout(milliseconds)	3000
- Digital Outputs	5.0.13	Retries	0
- No Flow - Adv Setup	5.0.17	Trailing Pad	None
Speed of Sound	5.3.0	Directory	Comm-Sillodbus
⊕ Display	5.0.15	Switched V-Batt/Operate	Enable
- Holding Registers	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.

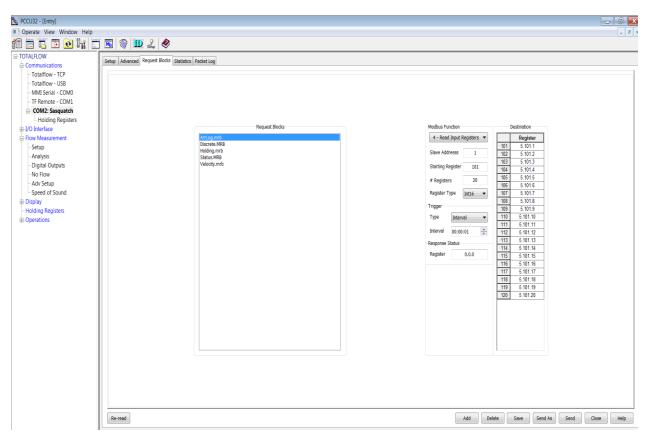


Figure 4: Request Blocks

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TOTALFLOW	Input Registers Arrival Log Velocity Log	Cuile Insuit Discustor Connector		
Communications	alput Registers Armvai Log Velocity Log	Louis Input Discretes Capacity		
- Totalflow - TCP	Description		Value	
- Totalflow - USB - MMI Serial - COM0	5.100.0 Input Registers	0		
TF Remote - COM1	5.100.1 Serial Number	-1		
COM2: Sasquatch	5.100.2 Serial Number	-1		
Holding Registers	5.100.3 Firmware Version - Major	1		
I/O Interface	5.100.4 Firmware Version - Minor	0		
Flow Measurement	5.100.5 Firmware Version - Fix	2		
Setup	5.100.6 Hardware Version	3		
- Analysis	5.100.7 Reserved	0		
- Digital Outputs - No Flow	5.100.8 Reserved	0		
- NO FIOW - Adv Setup	5.100.9 Hardware Model	3		
- Speed of Sound	5.100.10 Product Variant	0		
Display	5.100.11 Sensor State (0 or 1)	2		
Holding Registers	5.100.12 Dial Switch Setting (1-7)	7		
Operations	5.100.13 Sensor Sensitivity Thresho			
	5.100.14 Registers 14-100 (not used			
	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 - 5.100.24 -	0		
	5.100.24 -	0		
	5.100.25 -	0		
	5.100.27 -	0		
	5.100.28	0		
	5.100.29	0		
	5.100.20 -	0		
	5.100.31	0		
	5.100.31			
	Re-read Monitor		Print	Screen Save Send Close Help XHel

#### Figure 5: Input Registers

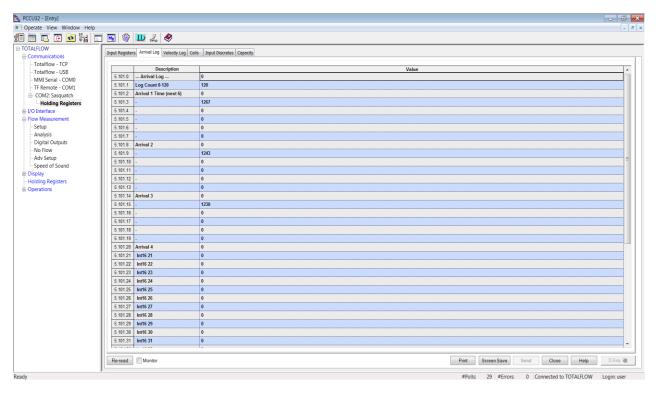


Figure 6: Arrival Log

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COUNT         Production - 102	🔁 🗽 🛅 🌃	i 🎯 🎹 2 🧶		
Control         Prode Registrer         Prode Registrer         Value           - Totallion - US         5:02         - Promet Wenkly Log-0         0           - Totallion - US         5:02         - Promet Wenkly Log-0         0           - Totallion - US         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Promet Wenkly Log-0         0           - Standard Registrer         5:02         - Resistrer         0           - Standard Registrer <th></th> <th></th> <th></th> <th></th>				
Setup         Control         Control         Setup         Privage Velocity Locup         Other Setup           COM2: Sequeth         S122         Private Antel Velocity         109         100	Input R	ut Registers Arrival Log Velocity Log Co	alls Input Discretes Capacity	
Field         5822         -Purget Velocity 0         0           MMI Scinit - COMI         5822         -Purget Velocity 0         0           COM2 Scinit - Comit         5822         Perform Velocity 0         0           COM2 Scinit - Comit         5822         Perform Velocity 0         0           Scinit - Comit - Comit         5822         Perform Velocity 0         0           Scinit - Comit - Comit - Comit Velocity 0         0         0           Scinit - Comit - Comit Velocity 0         0         0           Scinit - Comit - Comit Velocity 0         0         0           Scinit - Comit - Comit Velocity 0         0         0           Scinit - Comit Velocity 1         1463         100           Scinit - Comit Velocity 1         1465         100           Scinit - Comit Velocity 1         1465         20           Scinit - Comit Velocity 1         1465         100           Scinit - Comit Velocity 1         1465         100           Scinit - Comit Velocity 1         1465         100				
Missian Coluit         5 1021         Carrent Archial Velocity         178           IF Render Coluit         5 1022         Previous Antreal Velocity         0           I- Coluit         5 1022         Previous Antreal Velocity         0           I- Holding Registers         5 1022         Intel A         0           I- Portunation         5 1022         Intel B         10           I- Speed of Sound         5 1022         Intel B         0           I- Speed of Sound         5 1022         Intel B         0           I- Speed of Sound         5 1022         Intel B         0           I- Speed of Sound         5 1022         Intel B         0           I- Speed of Sound         5 1022         Intel B         0           I- Speed of Sound         5 1022 <th>ISB</th> <th></th> <th></th> <th>Value</th>	ISB			Value
Finder-Cond.         5122         Previou Artnel Velocity         0           COM2: Sayatch         5122         Int63         140           Comparing Compar	COM0			
Bolding Registers         6 102.3         krt6 3         1400           Bolding Registers         5 102.6         krt6 3         0           Bolding Registers         5 102.6         krt6 4         0           Bolding Registers         5 102.6         krt6 5         107.0           Bolding Registers         5 102.6         krt6 9         42.0           Bolding Registers         5 102.0         krt6 9         42.0           Bolding Registers         5 102.0         krt6 9         42.0           Bolding Registers         5 102.0         krt6 9         47.0           Bolding Registers         5 102.0         krt6 10         9.0           Bolding Registers         5 102.0         krt6 10         9.0           S 102.0         krt6 15         5 102.0         krt6 10           S 102.0         krt6	COM1	<b>.</b>		
UD Interface         5:02.4         int6.4         0           Flow Masurement         5:02.5         int6.5         1073           Analysis         5:02.6         int6.6         76.4           Digital Oxputs         5:02.7         int6.6         76.4           Analysis         5:02.8         int6.9         42.4           Analysis         5:02.1         int6.9         42.4           Speed of Sound         5:02.10         int6.10         0           Dapial Oxputs         5:02.11         int6.10         0           Speed of Sound         5:02.11         int6.10         0           Dapial Oxputs         int6.11         0         0           Str21 1         int6.12         0         0           Str22 1         int6.14         0         0           Str22 1         int6.12         0	ubicii			
Flow         Measurement         5:02.5         int6 5         1073           Analysis         5:02.6         int6 6         764           No Flow         5:02.2         int6 7         0           No Flow         5:02.8         int6 8         702           No Flow         5:02.1         int6 8         702           Special of Sound         5:02.2         int6 9         820           Display         int6 10         200         800           Special of Sound         5:02.2.1         int6 10         0           Display         int6 11         0         0           Special of Sound         5:02.2.1         int6 10         0           Special of Sound         5:02.2.1         int6 10         0           Special of Sound         5:02.2.1         int6 14         0           Special of Sound         5:02.2.1         int6 14         0           Special of Sound         5:02.2.1         int6 15         50           Special of Sound         15:02.2.1         int6 15         50           Special of Sound         15:02.2.1         int6 15         50           Special of Sound         724         50         50				
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Display         Int 8 a         702           Special Sound         5102         Int 6 a         283           Special Sound         5102.1         Int 6 a         30           Special Sound         5102.1         Int 6 b         744           Special Sound         5102.2         Int 6 b         30           Special Sound         5102.2         Int 6 b         0           Special Sound				
No Fow Speed of Sound         No. Bit Mo. 9         No. 1000           Display Speed of Sound         5102.1         Int 69         422           Holding Registers         5102.1         Int 61         0           Display         5102.1         Int 61         0           Speed of Sound         5102.1         Int 61         0           Display         5102.1         Int 61         0           Speed of Sound         1157         5102.0         Int 61         0           Speed of Sound         1157         5102.0         Int 61         0           Speed of Sound         11502.0         Int 51         0         0           Speed of Sound         1152.2         Int 52.4         0         0           Speed of Sound         1152.2 <t< td=""><td></td><td></td><td>-</td><td></td></t<>			-	
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Special Sound         5 402.0 km 616 0         280           Populary         5102.1 km 616 0         0           Populary         5102.1 km 610 0         0           Populary         5102.1 km 61 0         0           Populary         6102.1 km 61 0         0           Populary         100.2 km 61 0         0           Populary         100.2 km 61 0         0           Populary         100.2 km 61 0         0           S102.1 km 61 0         0         0           S102.1 km 61 0         150         0           S102.1 km 61 0         150         0           S102.1 km 61 0         73         0           S102.1 km 61 0         73         0           S102.2 km 62 0         0         0     <				
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5 102 16         Intf5 16         1157           5 102 17         Intf5 10         5 10           5 102 18         Intf5 16         74           5 102 18         Intf5 16         74           5 102 18         Intf5 16         74           5 102 19         Intf5 16         74           5 102 19         Intf5 16         74           5 102 10         Intf5 20         0           5 102 21         Intf5 20         0           5 102 22         Intf5 20         0           5 102 23         Intf5 20         0           5 102 24         Intf5 20         0           5 102 25         Intf5 20         0           5 102 26         Intf5 20         0           5 102 27         Intf5 20         0           5 102 28         Intf5 20         0			-	
S 102 rt         Intf6 17         S41           S 102 to         Intf6 16         74           S 102 to         Intf6 16         75           S 102 to         Intf6 20         0	5.1		50	
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5 102 19         kmf6 19         753           5 102 20         kmf6 20         0           5 102 21         kmf6 21         0           5 102 22         kmf6 22         0           5 102 23         kmf6 22         0           5 102 24         kmf6 24         0           5 102 25         kmf6 24         0           5 102 26         kmf6 24         0           5 102 27         kmf6 24         0           5 102 28         kmf6 24         0           5 102 20         kmf6 30         0	5.1	5.102.17 Int16 17	541	
5 102.20         kmt6 20         0           5 102.21         kmt6 21         0           5 102.22         kmt6 22         0           5 102.24         kmt6 23         0           5 102.25         kmt6 24         0           5 102.26         kmt6 24         0           5 102.27         kmt6 24         0           5 102.28         kmt6 24         0           5 102.29         kmt6 24         0           5 102.29         kmt6 24         0           5 102.29         kmt6 24         0           5 102.20         kmt6 24         0           5 102.21         kmt6 24         0           5 102.20         kmt6 30         0	5.1	5.102.18 Int16 18	744	
5.102.21         htth 52         0           5.102.22         htth 52         0           5.102.24         htth 52         0           5.102.24         htth 54         0           5.102.24         htth 54         0           5.102.24         htth 54         0           5.102.25         htth 54         0           5.102.26         htth 54         0           5.102.27         htth 54         0           5.102.26         htth 54         0           5.102.27         htth 54         0           5.102.28         htth 54         0           5.102.28         htth 54         0           5.102.28         htth 54         0           5.102.28         htth 54         0	5.1	5.102.19 Int16 19	753	
5.102.22         huff 52         0           5.102.24         huff 52         0           5.102.24         huff 54         0           5.102.25         huff 52         0           5.102.26         huff 52         0           5.102.26         huff 53         0           5.102.27         huff 54         0           5.102.28         huff 57         0           5.102.28         huff 58         0           5.102.28         huff 57         0           5.102.28         huff 58         0           5.102.28         huff 59         0           5.102.28         huff 59         0           5.102.28         huff 59         0	5.1	5.102.20 Int16 20	0	
5.102.23         Intf6.23         0           5.102.4         Intf6.24         0           5.102.4         Intf6.25         0           5.102.26         Intf6.26         0           5.102.27         Intf6.26         0           5.102.28         Intf6.26         0           5.102.29         Intf6.26         0           5.102.29         Intf6.26         0           5.102.29         Intf6.26         0           5.102.20         Intf6.26         0           5.102.29         Intf6.26         0           5.102.20         Intf6.30         0	5.1	5.102.21 Int16 21	0	
5 102 24         Iwrt6 24         0           5 102 25         Iwrt6 25         0           5 102 26         Iwrt6 76         0           5 102 27         Iwrt6 70         0           5 102 27         Iwrt6 72         0           5 102 28         Iwrt6 72         0           5 102 29         Iwrt6 72         0           5 102 29         Iwrt6 72         0           5 102 20         Iwrt6 72         0           5 102 20         Iwrt6 72         0	5.1	5.102.22 Int16 22	0	
5         14225         Mart6 25         0           5         1426         0         1           5         1427         Intfe 27         0           5         1425         Mart6 28         0           5         1422         Intfe 28         0           5         1422         Intfe 28         0           5         1422         Mart6 28         0	5.1	5.102.23 Int16 23	0	
5 102 28         Intf6 28         0           5 102 27         Intf6 27         0           5 102 28         Intf6 28         0           5 102 28         Intf6 29         0           5 102 20         Intf6 30         0	5.1	5.102.24 Int16 24	0	
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5.102.28         Intf6.28         0           5.102.29         Intf6.29         0           5.102.30         Intf6.30         0	5.1	5.102.26 Int16 26	0	
5.102.29         Intf6.29         0           5.102.30         Intf6.30         0	5.1	5.102.27 Int16 27	0	
5.102.30 Intt6.30 0	5.1	5.102.28 Int16 28	0	
	5.1	5.102.29 Int16 29	0	
	5.1	5.102.30 Int16 30	0	
	5.1	5.102.31 Int16 31	0	
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Reread Monitor Print Screen Save Send Close Help	Ren	Re-read Monitor		Print Screen Save Send Close Help X Help

#### Figure 7: Velocity Log

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⊟-TOTALFLOW		s Arrival Log Velocity Log Coils	Tana Dimetera Constant
Communications	alput Register	s Arrival Log Velocity Log Colla	alpia oscietes   capacity
- Totalflow - TCP		Description	Value
- Totalflow - USB	5.103.0		0 Value
- MMI Serial - COM0	5.103.1		0
- TF Remote - COM1			0
COM2: Sasquatch		, ,	0
- Holding Registers	5.103.4		0
E Flow Measurement	5.103.4		0
Setup	5.103.5		0
Analysis	5.103.6		0 0
- Digital Outputs	5.103.7		0 0
-No Flow	5.103.8	Reset Total Statistics Log Reset Modbus peripheral Error	
- Adv Setup		Lan.	0 0
Speed of Sound			0 0
Display			
- Holding Registers	5.103.12	Stop Plunger Detection	0
Operations			
	Re-read	Monitor	Print Screen Save Send Close Help X Hor 🕷
Ready			#Poils: 31 #Errors: 0 Connected to TOTALFLOW Login: user

Figure 8: Coils

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□ TOTALFLOW			Tanuk Disemban an a	
Communications	Input Registers Arriv	al Log   Velocity Log   Colls	Input Discretes Capacity	
- Totalflow - TCP		Description		
- Totalflow - USB	5.104.0Inpu		0 Value	
MMI Serial - COM0			0	
- TF Remote - COM1			1	
COM2: Sasquatch	5.104.2 Reserv	·····	1	
Holding Registers	5.104.4 Reserv		0	
Flow Measurement	5.104.5 Reserv		0	
Setup	5.104.6 Reserv		0	
Analysis	5.104.7 Reserv		0	
- Digital Outputs	5.104.7 Reserv		0	
- No Flow	5.104.9 Reserv		0	
- Adv Setup	5.104.10 Reserv		0	
- Speed of Sound		er Arrival Status (0 or 1)		
Display		/elocity Indicator (0 or 1)		
- Holding Registers	5.104.12 New V	relocity indicator (0 or 1)	U	
Operations				
	Re-read Mo	onitor		Print Screen Save Send Close Help X Help 🗮
Ready	1.			#Polls: 32 #Errors: 0 Connected to TOTALFLOW Login: user

#### Figure 9: Input Discretes

PCCU32 - [Entry]							3
Operate View Window Help						- 8	
10 🖻 🖪 🖸 💽 🙀 🗂	🖼 📎	Ш 🕹 🤌					
<b>⊟</b> -TOTALFLOW		Arrival Log Velocity Lo	an Caile I	and Discust	en Canacity		1
	siput Registers	s Arrival Log Velocity Li	og cons i	nput biscree	ES Copucity	1	h
- Totalflow - TCP		Description	Capacity	Туре	Persistence	Name	
- Totalflow - USB - MMI Serial - COM0	5.144.255	Number of Arrays	5				
TF Remote - COM1	5.144.0	Array 1	50	Int16	Non-Persistent	Input Registers	
COM2: Sasquatch	5.144.1	Array 2	50	Int16	Non-Persistent	Arrival Log	
Holding Registers	5.144.2	Array 3	50	Int16	Non-Persistent	Velocity Log	
I/O Interface	5.144.3	Array 4	13	Int16	Non-Persistent	Coils	
Flow Measurement	5.144.4	Array 5	13	Int16	Non-Persistent	Input Discretes	
- Setup							
- Analysis							
- Digital Outputs - No Flow							
- Adv Setup							
-Speed of Sound							
Display							
- Holding Registers							
Operations							
	Re-read	Monitor				Print Screen Save Send Close Help XHdp @	
Ready						#Polls: 33 #Errors: 0 Connected to TOTALFLOW Login: user	

#### Figure 10: Array List

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