Using *Bluetooth*-Enabled PosiTector 6000 with Statistical Process Control Software

SPC programs are available from third party vendors that enhance the measurement capabilities of the PosiTector 6000. With **Bluetooth** enabled, measurement results are immediately transferred wirelessly from the PosiTector 6000 to the SPC using a virtual serial port. This means that any program with a serial interface can use readings from the PosiTector using a **Bluetooth** connection. This below technical article details how to connect and receive the PosiTector 6000 with two Statistical Process Control software packages: This article details how to connect and use the PosiTector 6000 with two Statistical Process Control software packages: Proficient by InfinityQS, and WinSPC by DataNet systems. Although this article details specifically with the above programs, the methods used apply to any other program.



The PosiTector 6000 can be used as an input device for SPC programs. The measurements can be used to create control charts like this.

This article assumes that the gage has already been paired with the computer. For instructions on the pairing process, please see the *Bluetooth* Pairing instructions (<u>www.defelsko.com/bluetooth/</u>).

Adding the PosiTector 6000 as a Device in the Software

The first step is to create the PosiTector 6000 as a gage in the software. In Proficient, the serial devices are configured in the Gage Server program. In WinSPC, the PosiTector is configured by adding it as a "Device" from the Administrator screen.



The Gage Server Configuration Window in Proficient



Adding a Device in WinSPC

To add the PosiTector 6000 as a device in Proficient, click "Add..." in the Gage Interfaces Tab, to open the Gage Interface Selection. In WinSPC, double click on the new device, to open the Device Setup.

Gage Ir	nterface Select	lon	
. Gage Interface:		- D	ОК
Gage Connections		- I	
2			Cancel
B. Create C. Mo	dify D. Remove		Monitor
E. Serial Communication Port:	COM4	•	
F. Baud Rate:	9600		
G. Parity:	None	-	
H. Data Bits:	8	•	
	1	•	
I. Stop Bits:			
I. Stop Bits: J. Flow Control:	None	•	

The Gage Interface Selection Window in Proficient

erial	•	
Connection Reading	Mask	
Serial Settings Port	Parity	
COM4 -	None	
Baud Rate	Stop Bits	
9600 💌	1	
Data Bits	Hand Shaking	
8 🗾	None	
Use Prompt String		
	<nul></nul>	I I
, Use Channel Num	NUL> (SOH) (STX)	
j Ose channel Nulli		
Channel Number	<pre> <enq></enq></pre>	
C Numeric		

The Device Setup Window in WinSPC

In Proficient, select "Gage Connections" under Gage Interface. In WinSPC, select "Serial" as the Device type. The "Port" setting also must then be configured. This setting varies by computer:

To find the port setting needed for your computer, open "*Bluetooth* Devices" in the Control Panel, under Printers and Other Hardware.



Bluetooth Devices in the Control Panel, under Printers and Other Hardware

Bluetooth Devices	X	Bluetooth Devices	
Devices Options COM Ports Hardware		Devices Options COM Ports Hardware	
All other devices		This computer is using the COM (serial) ports listed below. To determine whether you need a COM port, read the documentation that came with your Bluetooth device.	۱
6000-3-629184 Passkey enabled		Port Direction Name	1
		COM3 Outgoing 6000-3-629184 'A7 Serial Port' COM4 Incoming 6000-3-629184	
Add Remove Propertie	25	Add Remove	
OK Cancel Ap	ply	OK Cancel Apply	ų

The Bluetooth Devices Window. Devices tab (left). COM Ports tab (right)

The *Bluetooth* Devices window will open. Your PosiTector should appear in the Devices tab. Click on the "COM Ports" Tab.

In the "COM Ports" Tab, there should be two listings for your PosiTector. We are interested in the "Incoming" port. In this case, it is COM4.

In Proficient, select the port identified in the previous step under "Serial Communication Port". In WinSPC, select your port in the "Port" dialogue box. Leave other settings such as Baud Rate, Parity, etc. at default settings.

Formatting the PosiTector 6000 Output for Use With the Software

After setting up the connection between the PosiTector 6000 and the *Bluetooth* programs, the gage output must be conditioned.

Gage Server Configura	ation	
	Gage Server Configuration	
Gage Interfaces Gaging	Devices	Close
A. Gaging Device	Gage Interface	
	1. Add 2. Edit 3. Delete	7

The Gaging Devices tab under Gage Server Configuration

Gaging Device Setup	
A. Description:	ОК
B. Interface: Gage Connections (COM4:9600,n,8,1) C. Format:	Cancel
D. Create E. Modify F. Remove G. Channel Number <ch>, [CH]: </ch>	~
I. DO NOT Send Gage Read Command When Polling Gage	
K, Gage Gain Value (Measurement x Gain):	1
L, Gage Zero Value (Measurement - Zero): M. Precision	
N. Return Absolute Value of Measurement	
O, Initialize Gage P, Initialize Port	
Minimum ? Maximum	1
Q, Read Gage	?

The Gaging Device Setup window

In Proficient, cluck OK in the Gage Interface Selection window. You are returned to the Gage Server Configuration window. Click the "Gaging Devices" tab and click "Add..." Name the Gage ("PosiTector 6000", in this example) and click the "D. Create" button.

Gaging Device Format Definition		Gaging Device Format Definition	
Interface Configuration		Interface Configuration	
Format Description: Record Description: A. Name: P. Ecord Description: B. Type: P. Record Description: C. Resolution (bits): P. Record Start: D. Full scale value: I. Field Separator: E. Decimal Separator: I. Field Separator: Multiplexer Channel Number: P. Record Length Command Sample J. Multiplexer Channel Number: P. Record Number: W. Defect/Defective Code: P. Record Number: N. Reading Number: P. Record Number: P. Litteral (NRM, MIN, MAX): P. Record Number: P. If both Measurement Value B: P. If both Measurement Value B:	Sove Save as New Cancel	Format Description: Record Description: A. Name: F. Record Description: B. Type: Image: Comparison of the second description: C. Resolution (bits): Image: Comparison of the second description: D. Full scale value: Image: Comparison of the second description: E. Decimal Separator: Image: Comparison of the second description: Field Name Field # Start Position Length Command Sample J. Multiplexer Channel Number: Image: Command Sample L. Literal (NRM, MIN, NAX): Image: Command Sample N. Reading Number: Image: Command Sample N. Measurement Value A: Image: Command Sample P. If both Measurement Value A and B are defined then return Image: Command Sample Image: Command Sample	Save as New Cancel Advanced
		<2> 780 um F<15><10> I3	
Q: Read Gage Reading S. Initialize Gage T. Initialize Port	?	Q. Read Gage R. Continuously Poll for Gage Reading S. Initialize Gage T. Initialize Port	?

The Gaging Device Format Definition Window

This opens the "Gaging Device Format Definition" window. Select "**R. Continuously Poll For Gage Reading**". Take a reading with the PosiTector 6000. At this point, the gage will attempt to connect to Proficient, and the *Bluetooth* icon on the gage will blink. When the connection is established, the gage will beep, and the icon will become a black symbol on a white background. Take another reading. The reading will display in the box at the bottom of the window.

Device Setup - Positector 6000	Device Setup - New Device
Device Setup - Positector 6000 Device Type: Serial Connection Reading Mask	Device Setup - New Device Device Type: Serial Connection Reading Mask
Get Reading reading Settings Terminator C Lines C Length C Length C Time Dut	Stop Reading reasung setungs Terminator C Lines Image: CEP Lines C Length 13 C Time Out
OK Cancel Help	OK Cancel Help

In WinSPC, select the "Reading" Tab in the Device Setup Window. Click the "Get Reading" button. Take a reading with the PosiTector 6000. At this point, the gage will attempt to connect to WinSPC, and the **Bluetooth** icon on the gage will blink. When the connection is established the gage will beep, and the icon will become a black symbol on a white background. Take another reading. This reading will appear, along with some other characters. Click "Stop Reading" to save the reading.

In each program, the data is unusable in its current state, with extra, unwanted characters:

The goal is to extract the numerical measurement from this string; in this case we want to extract '780'. To do the extraction, we need to specify three things:

- The location of the beginning of the data The data begins with a "start of text" character. It is represented by a hexadecimal value of <2> or a character value of <STX>
- The length of the numerical data After the "start of text", the numerical data will always reside in the first 5 characters.
- The location of the end of the data The data ends with a "carriage return" and a "line feed" character. They are represented by hexadecimal values <13><10> or character values <CR><LF>

	Interface Co	nfiguration		
ormat Description: A. Name: Postector 6000 B. Type: C. Resolution (bits): D. Full scale value: E. Decimal Separator:	G. Reco	d Length:	(2) (13)<(10) 	Save Save as New Cancel
Field Name Field# 3. Multiplexer Channel Number:	Start Position Length	Command	Sample	
<2> 780 um F<13><10> O, Read Gage Ø. R. Continuously Pol		5. Initialize Gage	T. Initialize Port	

In Proficient, enter a name for the Device beside **A. Name:** (In this example, PosiTector 6000). Beside **G. Record Start:**, enter <2> . Beside **H. Record Terminator:**, enter <13><10> . Beside **N. Measurement**

Value A:, enter 1 under Start Position, and enter 5 under Length. Your window should look the same as the window above. Press S. Initialize Gage, and take another reading.

	Interfa	ice Configuration		
Format Description: A. Name: Positector 6000 B. Type: C. Resolution (bits): D. Full scale value: E. Decimal Separator:		Record Description: F. Record Length: G. Record Start: H. Record Terminator: I. Field Separator:	(13>(1)) (13>(1)) (1)	Save Save as New Cancel Advanced
Field Name J. Multiplexer Channel Number: K. Defect/Defective Code: L. Likeral (IRM), MIM, MAX): M. Reading Number: N. Messurement Value A: O. Messurement Value B: P. If both Measurement Values A and B Initialize [22 780 um F<13><10>		Length Command	Sample 0 +780 +0 13)

If the setup is correct, the reading on the gage should be the same as the value displayed beside **N**. **Measurement Value A:** and under **Sample**. Take another reading, and ensure that the value displayed reflects the new reading. If it does, click **Save as New**.

A. Description: Positector 6000	ОК
B. Interface: Gage Connections (COM4:9600,n,8,1)	Cancel
C. Format: Positector 6000	
D. Create E. Modify F. Remove	
G. Channel Number <ch>, [CH]:</ch>	
H. Gage Identifier <id>, [ID]:</id>	
I. Gage Serial Number [SN]:	
J. DO NOT Send Gage Read Command When Polling Gage	
K. Gage Gain Value (Measurement × Gain): +1	
L. Gage Zero Value (Measurement - Zero): +0	
M. Precision 7	
N. Return Absolute Value of Measurement	
O. Initialize Gage P. Initialize Port	
Minimum ? Maximum	
+0 +0	

You are returned to the **Gaging Device Setup** window. Ensue that the Format you created in the last step (In this example, "PosiTector 6000") is selected next to **C. Format**, and enter a description next to **A. Description.** (In this example, PosiTector 6000) The gage setup is complete!

Device Setup - New Device						
Device Type: Serial						
Connection Reading Mask						-
Get Reading Reading Settings						
← Terminator ← CEN> <le> ←</le>		<nul> <soh> <stx> <etx> <edt> <enq></enq></edt></etx></stx></soh></nul>				
C Time Dut 5		KACKS	<u>~</u>			
	OK	Cancel		<u>H</u> elp		

In WinSPC, select the Mask tab.

Device Setup - New Device	Device Setup - New Device
Device Type: Serial Connection Reading Mask 1780 um F	Device Type: Serial Connection Reading Mask 780 um F
Hex Test Locations Location Channel Data Data Data Data Data Data Data Dat	Hex Test Locations Type Location Value Channel Data Data Data Data Data Data Data Data
OK Cancel Help	OK Cancel Help

First, ensure that the cell next to **Data** and under **Value** is selected. The select the checkbox next to **Prefix** and enter **<STX>** in the text box next to **Prefix**.

Device Setup - New Device
Device Type:
Serial
Connection Reading Mask
780 um F
6
Hex Test
Location Locate By Location
Type Location Value Lucate By Lucation Line Line
Channel Channel Field:
Data 🗸 Data
C Offset
Pength Length: 5
OK Cancel <u>H</u> elp

Next, select the checkbox next to **Length**. Then, click on the reading, just after the last digit (see the cursor in the above image). The value next to **Length** (indicated by the red circle in the above picture) should read **5.** If it does not, keep clicking on the reading until the **Length** value is **5.**

evice Setup -	New Device				
Device Type:					
Serial	_				
Connection R	eading Mask				
780 um F					
Hex	Test				
Locations				.ocate By	Location
Туре	Location	Value		T Line	Line:
Channel	Channel		I	Delimiter	Field:
Data 💌	Data		I	✓ Prefix <stx></stx>	
			ſ	Offset	Offset:
			F	🗸 Length	Length: 5
			-		
			ncel H		
		OK Car	<u>H</u>	elp	

When your window looks like the above picture, click **Test**.

evice Setup - New Devic			
revice Type: Serial			
Connection Reading Mask	1		
780 um F			
	_		
Hex Stop Test			
Locations		Locate By	Location
Type Location	Value	🕂 🖵 Line	Line:
Channel Channel	[not used]	Delimiter	Field:
Data 💌 Data	780	Prefix <stx></stx>	
1 m		C Offset	Offset:
		🔽 Length	Length: 5
		-	
1			
	OKCa	ncel <u>H</u> elp	

Take a few readings and wait for the gage to beep, signaling that it has re-established a connection. Then, take one reading. The value next to **Data** and below **Value** will reflect the reading that was taken. Click **OK**. The gage setup is now complete!

Configuring the Data entry Dialog to use Gage Measurements

After the gage is reading correctly into the software, the device is simply added into the collection plan.

ata Entry Configuration: Standa	rd			
	SPC Meas	urements		
Required Items Optional Items Basic (Options Advanced	Options		
A. Data Entry Configuration Name:				ОК
SPC Measurements				Cancel
' B. Sample Size (Number of items per sut	oaroup):			
	fy Sample Size on sul	ogroup: 🥅 Add	T Save	View
C. Part:				
Samples (Sample Part) *				Сору
Select		Create	Edit	Paste
D. Process:				
Process Group (Process 1) *				
Select		Create	Edit	
E. Tests:				
Coating Thickness (Coating Thickness)	(Gauge)			
			ų.	
Add Remove	Change	Create	Edit	
Kelliove	change		Eultri	7

The data entry configuration screen.

In Proficient, under the Data entry Configuration window, create the data entry configuration as usual. Select the tests where PosiTector input is desired, and click the "..." button.

	ing Thickness)	
otions:		ОК
A. Reselect Options 1. Selectable by user + 3. DATA ENTRY METHOD		Cancel
1. Manual/Keyboard +		
2. Gage Server +	<enabled></enabled>	
3. Dynamic Data Exchange (DDE) +		
4. Calculation +		
5. Database Value +		
6. Historian Value +		
I. Gage Tracking		
1. Track gage selection +		
Valid certificate of calibration required		
3. Valid gage study required		
D. TEST MANAGEMENT		
1. Use for calculation only (don't save)		
2. Allow operator to skip characteristic		
 Skip characteristic if no specification limit defined 		
5. SNP characteristic in no specification limit defined . Miscellaneous Options		
1. Set Characteristic Boundary		
2. Enter value as Deviation from Target (DFT)		
3. Enter value as Deviation From Factor (Spec)		
 Subtract offset/tare value from measured value + 		
5. Auto-increment defect code count		
6. Do not fill code list		
Automatically fill test values down		
 Use alternate sample size + 		

The Data Entry Configuration Properties Screen

In the Properties dialogue, select "Gage Server" under Data Entry Method" and click the "Enable" Button.



The Gage Server Properties Screen

In the Gage Server Properties Screen, select the gage created earlier ("PosiTector 6000" in this example) as the Electronic gaging device, and ensure "Continuously poll gaging device for reading" is checked. Proficient is now configured to poll the PosiTector 6000 for measurements during the specified tests.

Step Options Tag Options	Navinator Visual Grou	p Options Collection Plan Options
Item Name Coating Thickness	Part/Process Name VProduct	General Timed Data Collection Blueprint Chart Layout Collection Method: Sample Size: Sequential ♥ Pefault User Interface Type: Spreadsheet ♥ ♥ Show Charts Yisual Group: A - ♥ Collect With: [VPositector 6000 Channel Number / Item Name: Location: Data ♥ Mow Keyboard Entry

The Collection Plan Screen

In WinSPC, when creating a Collection Plan, select the measurement variable, and click "Browse" next to the "Collect With" dialogue. Select the gage interface created earlier (PosiTector 6000 in this example).

Using PosiTector 6000 To Create SPC Measurements

The gage configuration is now complete. Use the PosiTector 6000 instead of the keyboard to input data.



Proficient- Data Entry in Proficient using the PosiTector 6000



Proficient- Example SPC chart using readings from the PosiTector 6000



WinSPC- Example data entry and SPC chart using readings from the PosiTector 6000