



BANNER PRESENCEPLUS APPLICATION NOTE

ABSTRACT

The purpose of this document is to describe the G3's support for Banner's PresencePlus series of vision systems, and the configuration steps necessary to use this feature.

INTRODUCTION

Banner is a manufacturer of vision sensors. One of their specialties is vision and object recognition. All the PresencePlus series of vision sensors are now supported by Red Lion Controls G3 series HMIs. Only graphical color units support this feature.

This document will first describe how to configure a G310 HMI to communicate and transfer data with a PresencePlus vision sensor, then how the sensor should be configured.

This document will step though the procedures to setup the communication for the following functions:

- Trigger (Input Flag)
- Pass Output (Output Flag)
- Pass Count (Integer value contained in a register)
- Measurement (Floating Point Number value contained in a register)
- Tool name (String value contained in a register)

As an example, the PresencePlus P4 OMNI vision sensor will be measuring the opening of a Banner Fiber cutter (PFC-2).



TABLE OF CONTENTS

Abstract	.1
INTRODUCTION	.1
TABLE OF CONTENTS	.2
G3 CONFIGURATION - DISPLAYING THE IMAGE	.3
Activating the Ethernet port	3
Setting up the Banner Camera driver	. 4
Inserting the camera primitive on the screen	. 4
SETTING UP THE G3 – INSPECTION FILE TRANSFER	.6
Loading files to the Camera	. 6
Saving files from the Camera	. 6
Selecting the inspection file in the camera	. 7
Program examples for inspection file transfer and selection	. /
SETTING UP THE G3 – DATA EXCHANGE	.9
Configuring the PresencePLUS data driver	. 9
Configure the Device Settings	. 9
Information on Data Tags	10
Configuring Data Tags	10
SETTING UP THE CAMERA	13
Configuring the system settings	13
Configuring the Inspection	14
Configure the vision sensor to accept product changes	14
	15
Activating image export	10

G3 CONFIGURATION – DISPLAYING THE IMAGE

Red Lion Controls' G3 HMIs are programmed using Crimson 2.0 software. This software is free and available on the internet at <u>www.redlion.net</u>



Displaying the camera image on the G3's display is achieved with the following steps:

- a. Activating the Ethernet port,
- b. Setting up the Banner Camera driver,
- c. Inserting the camera primitive on the screen.

Activating the Ethernet port

The configuration of the Ethernet port is done in the Communication Module.

- 1. Click on the word "Ethernet". This will display the Ethernet settings of the HMI.
- 2. Change Port Mode: to Manual Configuration.
- 3. Change the IP address of the HMI to an appropriate IP address (i.e. 192.168.0.10)

🗗 Untitled File - G310 - Crimson 2.0					
File Edit View Link Help					
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Communications		1000			
	Port Settings				
	Port Mode:	Manual Configuration	-	2	
RS-485 Comms Port	IP Address:	192 . 168 . 0	. 10	3	
S Protocol 1	Network Mask:	255 . 255 . 255	. 0		
Protocol 3	Gateway:	0.0.0	. 0		
Frotocol 4	IP Routing:	Disabled 💌			
🖂 Mail Manager					
DPC Server	Physical Layer —				
Sync Manager	🔽 Enable Full D	ouplex			
	Enable High	Speed			

Setting up the Banner Camera driver

The driver for the Banner Camera is configured on one the Ethernet protocols.

- 1. Click on Protocol 1
- 2. Click Edit to open the driver selection box
- 3. Pick the Banner PresencePlus Image driver

Communications	present encoded in the second encoded in the second	×
G3 G3 G4 Programming Port G5	Driver Selection Driver: No Driver Selected Edit 2	
Ethernet	Clear Port Settings	
Protocol 3 Protocol 3 Protocol 4 Services Mail Manager Adenus FIP Server Time Manager Sync Manager Beckho EtherN EZ Autu Gail GE Honeyn	el OK Cancel Help	

Then, configure the camera settings. Multiple cameras can be supported under this protocol by clicking Add Additional Device

- 4. Click on Cam1 to select the camera
- 5. Enter the camera's IP Address and TCP port

G3	Device Settings
=0 RS-232 Comms Port	✓ Enable Device
Ethernet	- Target Device
Protocol 1 - PresencePLUS	IP Address: 192.168.0.1
	TCP Port: 2000C
	Terrer Terreration 10
C Protocol 4	Image Imedut: J IO S
E Services	
	Delete This Device
Time Manager	
Sync Manager	

Inserting the camera primitive on the screen

To insert the camera picture on the screen, enter the User Interface module.

- 1. Select the Camera primitive in the Drawing box
- 2. Click and drag on the screen to insert the primitive

User Interface - Page1	- 1985 - 1985	- 100	1 - March - 1 - March	X
Pages				
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- 3. Double-click the primitive to open the properties
- 4. Select the camera that was configure in the Communication module

User Interface - Page1	X
Pages	
Page1	
	🔁 Camera Properties 🔀
	Source
Drawing	Camera: Cam1
	Scale: No Scaling
3 m 🛡 🔲 📖	Fill Style: Solid Color
	Fill Color 1: ▼ Fixed Gray ▼ Pick
	Fill Color 2: Fixed Black Picker
	Line Color: Fixed White Pick
	Display State
	Show Item: General TRUE Edit
	OK Cancel Set As Defaults
Close	

The HMI is now ready to receive the Banner Camera images. The image will be displayed in the gray area defined by the primitive. If the image is too small, the scale property in the camera primitive can be adjusted.

NOTE: The HMI will only display an image if the camera is configured to export the image, as shown later in this document.

SETTING UP THE G3 – INSPECTION FILE TRANSFER

This functionality allows the transfer of inspection files from the G3 Compact Flash card to the camera memory. Built in functions provide both download and upload as well as inspection file selection.

This feature uses the Banner camera driver, therefore the Ethernet port has to be setup as shown in the first section of this document; Setting up the G3 – Displaying the picture.'

Refer to the Crimson 2.0 manual for more details on how to run user programs.

NOTE: For the vision sensor to accept product changes from the G3 HMI, the run time setting in the camera must be set to hardware input in the Select tab of the run screen. Please refer to the section *Setting up the camera - Configure the vision sensor to accept product changes* later in this document for more details.

Loading files to the Camera

The following function loads the inspection file from the G3 CompactFlash card into the camera's memory. This function can be called in a user program.

***NOTE**: The program should be run in the background so the G3 has enough time to access the CompactFlash card.

ARGUMENT	ΤΥΡΕ	DESCRIPTION
port	int	Port number where the Banner camera is connected
device	int	Camera device number
fileNb	int	Inspection file number in the camera
fileName	cstring	Path and filename for the inspection file on the G310 Compact Flash card

LOADCAMERASETUP(PORT, DEVICE, FILENB, FILENAME)

This function returns true if the transfer is successful, false otherwise.

Example: Result = LoadCameraSetup(4, 0, 1, "\\in0.isp");

Saving files from the Camera

The following function saves the inspection file uploaded from the camera on the G3 CompactFlash card. This function can be called in a user program.

***NOTE**: The program should be run in the background so the G3 has enough time to access the CompactFlash card.

ARGUMENT	Түре	DESCRIPTION
port	int	Port number where the Banner camera is connected
device	int	Camera device number

fileNb	int	Inspection file number in the camera
fileName	cstring	Path and filename for the inspection file on the G310 Compact Flash card

This function returns true if the transfer is successful, false otherwise.

Example: Result = SaveCameraSetup(4, 0, 1, "\\in0.isp");

Selecting the inspection file in the camera

The following function will select the inspection file to be used by the camera.

***NOTE**: The program should be run in the background to allow the camera enough time to change files.

USECAMERASETUP(PORT, DEVICE, FILENB)

ARGUMENT	Түре	DESCRIPTION
port	int	Port number where the Banner camera is connected
device	int	Camera device number
fileNb	int	Inspection file number in the camera

This function returns true if the file change is successful, false otherwise.

Example: Result = UseCameraSetup(4, 0, 1);

Program examples for inspection file transfer and selection

In this example, the G3 has one internal variable named "status" to display the status of the upload/download/change process.

- 1. Open the tag window
- 2. Create an internal string variable called status

There are three basic programs needed for this demo; one to store an inspection to the CF, one to load an inspection from to CF, and one to initiate a product change. Storing and loading inspections run in the background, the vision sensor can processes inspections while transferring inspections.

Note: A product change must be initiated to run an inspection that has been loaded onto the sensor.

This example will store inspections from memory location 1 on the OMNI to the CompactFlash card. Program name: "SaveAsInp1".

```
Status = "Saving";
Sleep(10);
if ( SaveCameraSetup(4, 0, 1, "\\in1.isp))
        Status = "Done";
else
        Status = "Failed";
```

This example will load the inspection from the CompactFlash card to memory location 1 in the OMNI Vision sensor. Program name: "LoadInp1"

```
Status = "Loading";
Sleep(10):
if(LoadCameraSetup(4, 0, 1, "\\in1.isp"))
Status = "Done";
else
Status = "Failed";
```

This example will initiate a product change by selecting the inspection in memory location 1 of the OMNI vision sensor. Program name: "UseInp1"

```
Status = "Working";
Sleep(10);
if(UseCameraSetup(4, 0, 1))
Status = "Done";
else
Status = "Failed";
```

Programs can be executed using a push button or an event action field in the G3.

SETTING UP THE G3 – DATA EXCHANGE

In order to read/write data from the camera, the PresencePlus data driver is used. This driver provides access to standard camera information and also user defined Modbus registers in the camera.

Configuring the PresencePLUS data driver.

- 1. Click on Protocol 2
- 2. Edit the Driver Selection
- 3. Choose Banner
- 4. Choose PresencePLUS Data



Configure the Device Settings

- 1. Click on "PLC1" (If desired, rename it to "PresencePLUS")
- 2. Change the IP address to match the Sensor's IP address (i.e. 192.168.0.1)

Close out the Communications Window



Information on Data Tags

All the standard information available in the PresencePLUS vision sensor can be accessed directly with the driver and do not require Modbus mapping.

In this example, the following information can be accessed directly:

- Trigger (Input Flag)
- Pass Output (Output Flag)
- Pass Count (Integer value contained in a register)

However, the following two will be user defined when programming the vision sensor:

- Measurement (Floating Point Number value contained in a register)
- Tool name (String value contained in a register)

NOTE: In the HMI driver, Input and Output are defined from the PresencePLUS Sensor point of view. Therefore, the G3 will write data the sensor input and read data from the sensor output.

For more information on how Modbus/TCP registers are organized for the PresencePLUS vision sensors, refer to the Appendix.

Configuring Data Tags

Configuring sensor defined tags

Create a Trigger Coil (Flag) Tag

- 1. Click on Flag
- 2. Click on the newly created Flag variable

Data Tags	and the second	X
⊡ 🖷 Tags └─♥ Var1 2	Create New Variable Integer Multi Real String Create New Formula	

- 3. Under Mapping, Select PresencePLUS (PLC1)
- 4. Choose Input Flags
- 5. Select **IT** Trigger
- 6. Click OK.

Select Address for Banner PresencePLUS Data	
Pata Item	
Input Flags	
IR. Remote Teach IP. Product Change IS BCR String Change Details	
Output Pags ACK Flags Output Registers 3xxxx Utput Registers 41xxx	dit
Input Registers Maximum:	ital ta y y
Bit as Bit	

7. Change Access to Write Only (not shown)

This Tag is finished; click "tags" on the explorer bar window to get back to the main tags page. Creating the other tags is very similar.

Create a Pass Output (Flag) Tag

- 1. Click "Create a new variable" Flag Button
- 2. Select the new variable in the explorer window
- 3. Under Mapping select PresencePLUS (PLC1)
- 4. Select **OP** Pass
- 5. Click OK
- 6. Change Access to Read Only

Create a Pass Count (Integer) Tag

- 1. Click "Create a new variable" Integer Button
- 2. Select the new variable explorer window
- 3. Under Mapping select PresencePLUS (PLC1)
- 4. Choose Output Registers 31xxx
- 5. Select **O3P** Pass Count
- 6. Click OK
- 7. Change Access to Read Only
- 8. Change Sign mode to Treat as Unsigned

Configuring user defined tags

The following tags will be set up in the PresencePlus sensor in the section "Setting up the camera". Tag values will be linked to Modbus register addresses in the sensor. The set up will be as follow:

- Measurement Register 35 (400033)
- Tool name Register 37 (400035)

The generic part of the PresencePLUS data driver has to be used to access these registers.

Create a Height Measurement (Real) Tag

- 1. Click "Create a new variable" Real Button
- 2. Select the new variable explorer window
- 3. Under Mapping select PresencePLUS (PLC1)
- 4. Choose Modbus Register Address
- 5. Enter Element 400033 (shown below) (See Appendix A)
- 6. In Data Type choose Word as Long (shown below)
- 7. Click OK
- 8. Change Access to Read Only
- 9. Click on the Format tab
- 10. Change the digits after the DP (Decimal Point) to 2

		Element		
<none> No Selection Input Flags Output Flags ACK Flags Output Registers Output Registers Modbus Register 5 ata Iype</none>	3xxxx 41xxx Address	A 000 Details Type: Minimum: Maximum: Radix:	33 6 Word 400001 465535 Decimal	
Word as Word				

Create a Tool Name (String) Tag

- 1. Click "Create a new variable" **String** Button
- 2. Select the new variable explorer window
- 3. Select the Data tab
- 4. Under Mapping select PresencePLUS (PLC1)
- 5. Choose Modbus Register Address
- 6. Enter Element 400035 (See Appendix A)
- 7. Click OK
- 8. Choose Encoding: Packed High-to-Low
- 9. Choose Access: Read Only
- 10. Choose Length: 20

All the necessary tags are created. Close out the Data Tag window and open the User Interface window. In the User Interface Window add text to display the tag values, and a button for the trigger.

User Interface - Page1	tent tent tent	- mail mail mail	2000
Pages			
Page1			
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	D0-++-0000		
	Passoutput: 0ff	Height:00000.00	
	PassCount:00000	Iniggon	
	ToolName:XXXXXXXX	Off	
Close			

SETTING UP THE CAMERA

The PresencePlus vision sensor setup is done in 3 steps:

- a. Configure the System settings
- b. Configure the Inspection
- c. Configure the communication tool

For this example PresencePLUS PC software version 2.7.0 was used with a P4 OMNI version 1.1.0. Setting up Modbus/TCP is identical for all PresencePlus vision sensors.

Configuring the system settings

Click on the "System" button in the upper right hand corner, and the following dialog box should appear:

Sensor IP Address: 192 . 168 . 0 . 1 Subnet Mask: 255 . 255 . 0 Modify Address History Informat Communication Tool Setup Connection 2 Industrial Ethemet Settings 3 Protocol C DCC (SLC/PLC05) C Ethemet/IP C MSW - LSW	eneor IP Addrees Setun		a Stateop inspection select	Language		
Connection	Sensor IP Address: 192 . 168	. 0 . 1 Subnet Mask:	255 . 255 . 255 . 0	Modify	Address History	Information
Connection Host PC IP Address: Industrial Ethemet Image: Connection Settings Image: Connection Protocol Image: Connection Modbus/TCP Image: Connection Protocol Image: Connection Modbus/TCP Image: Connection PcCC (SLC/PLC05) Image: Connection Ethemet/IP Image: Connection	ommunication Tool Setup				215 4 11	
Industrial Ethemet 192 168 0 10 Settings Protocol 32 Bit Format © Modbus/TCP © LSW - MSW © PCCC (SLC/PLC05) © MSW - LSW	Connection		-	Host PC	. IP Address:	10
Settings Protocol Modbus/TCP	Industrial Ethemet			192	. 168 . U	. 10
Protocol Modbus/TCP C PCCC (SLC/PLC05) C Ethemet/IP	C. 117					
Protocol 4 32 Bit Format • Modbus/TCP • PCCC (SLC/PLC05) • Ethemet/IP • LSW - MSW • MSW - LSW	bettings					
C PCCC (SLC/PLC05) C Ethemet/IP C Sthemet/IP	Protocol	32 Bit Format				
C Bthemet/IP	C PCCC (SLC/PLC05)	LSW - MSW				
	C Ethemet/IP	C MSW - LSW				
Information			Information			

- 1. Go to the Communication tab
- 2. Choose Industrial Ethernet
- 3. Choose the Protocol called "Modbus/TCP"
- 4. Leave the 32 Bit format at the default setting "LSW-MSW". Press the OK button to accept this selection.

After the system settings are configured, the Banner vision sensor automatically transfers the discrete I/O and inspection Pass / Fail information through the Industrial Ethernet. The communication tool data is only needed if you would like to send vision tool results, like measurement values, tool names, BLOB Counts, or Bar Code strings to the remote device.

Configuring the Inspection

In this example, we will create an inspection measuring the height of the fiber cutter using two edge tools, a measure tool, and a test tool.



Configure the vision sensor to accept product changes

For the vision sensor to accept product changes from the G3 HMI, the run time setting must be set to hardware input in the Select tab of the run screen.



Configuring the Communication Tool

After the test tool we add a communication tool to export the measure tool name (Height) and the measurement distance (Height). The communication tool is configured as the following:

- 1. Connection(s) is set to Industrial 3. Select Distance and Tool Name Ethernet
- 2. Select the measure tool (Height) **Comunication Tool** Input Height CT_1 Name: Tool(s): EDGE_1 4 Remove All ection(s) View Settings Industrial Ethernet 💌 utput Filter TestTool: <none> •
- 4. View the Register number

Comunication Tool	
Tool Name Success Execution Time Min Execution Time Min Execution Time Max Distance Distance X Distance Y Origin Point Measure Location Point 1 Measure Location Point 2 Measure Location Point 2	Select All Clear All Remove Tool PLC Map
Name: Distance Regist	er - 34
	Next

Notice that the Register number for the distance measurement is 33 - 34 (30033). That number is the default number but it can be changed by click on the up/down arrows under Register.

Next

Note: Click on the PLC Map to view all the items selected in the communications tool.

CT 1		Tool Result	Туре	Modbus Register	
	Height	Distance	Float	33 - 34	
CT_1	Height	Tool Name	String	35 - 42	

The PLC map will display the tool name, the results that will be exported, the data type, and the Modbus Register. This map can be saved as a text file on your PC. Then save the inspection.

Activating image export

Finally, the last step before starting the camera is to check Image Enable under the Monitor tab so the G3 can display it in the primitive.

The image to be displayed in that primitive is defined under the display window. Possible choices are available such as Next Pass for a continuous display or Next Fail to get only failed images or any other setting relevant to your application.

Click Start to start the camera.

At this point, you can minimize the vision sensor software, or close it out entirely.

Run	
Monitor Select Lo	g
Selected Inspection OMNI.in	np (Software)
Display Next Pass Next Next Fail None None	Capture Control
Next RT Fail Results	
Pass Count: Fail Count: Total Count:	6010 0 Reset 6010
_Inputs 	Product Select
	System 3
	Resolution 1:1
000	Resolution 1:1

This concludes the configuration of the camera. Connect the PresencePLUS P4 OMNI to the HMI with a crossover Ethernet cable.

		Modbus	s Register Summary								
	Co	pils			Words						
Input Flag	g (Input coils	00001-00016)		Output Registers 30001-30960							
Register	Bit Position	WORD NAME		Register	WORD NAME						
00001	0	Trigger		30001	Output Flags (coils 10001-16)						
00002	1	Remote Teach		30002	ACK Flags (coils 10017-32)						
00003	2	Product Change		30003	Inspection Number						
00004	3	reserved		30004	System Error Count						
00005	4	reserved		30005 - 6	Frame Count						
00006	5	reserved		30007 - 8	Pass Count						
00007	6	reserved		30009 - 10	Fail Count						
80000	7	reserved		30011 - 12	Missed Triggers						
00009	8	BCR String Change		30013 - 14	Iteration Count						
00010	9	reserved		30015 - 32	reserved						
00011	10	reserved		30033	Location 1						
00012	11	reserved		30034							
00013	12	reserved		30035	Location 2						
00014	13	reserved		30036							
00015	14	reserved		30037	Location 3						
00016	15	reserved		30038							
Output Fla	ags (Output C	Coil 10001-10016)		30957	Location 463						
Register	Bit Position	WORD NAME		30958							
10001	0	Pass		30959	Location 464						
10002	1	Fail		30960							
10003	2	Error									
10004	3	reserved		Input Registers	40001-41000						
10005	4	Ready		Register	WORD NAME						
10006	5	reserved		40001	Input Flags (Coils 00001-16)						
10007	6	reserved		40002	Product Select						
10008	7	reserved		40003 - 39	reserved						
10009	8	I/O 1		40040 - 139	BCR Compare String						
10010	9	I/O 2		40140 - 239	BCR Compare Mask						
10011	10	I/O 3		40240 - 1000	reserved						
10012	11	I/O 4									
10013	12	I/O 5		Output Register	rs 41001-42000 (same as 30000 Reg)						
10014	13	I/O 6		41001	Output Flags						
10015	14	reserved		41002	ACK Flags						
10016	15	reserved		41003	Inspection Number						
				41004	System Error Count						
ACK Flag	(Output coils	s 10017-10032)		41005 - 1006	Frame Count						
Register	Bit Position	WORD NAME		41007 - 1008	Pass Count						
10017	0	Irigger Ack		41009 - 1010	Fail Count						
10018	1	Remote Teach Ack		41011 - 1012	Missed Triggers						
10019	2	Product Change Ack		41013 - 1014	Iteration Count						
10020	3	reserved		41015 - 1032	reserved						
10021	4	reserved		41033	Location 1						
10022	5	reserved		41034							
10023	6	reserved		41035	Location 2						
10024	1	reserved		41036							
10025	8	BOR Str Change ACK		41037	Location 3						
10026	9	reserved		41038							
10027	10	reserved			Lanation 400						
10028	11	reserved		41957	Location 463						
10029	12	reserved		41958	Leasting 404						
10030	13	reserved		41959	Location 464						
10031	14	reserved		41960							
10032	15	reserved		41961 - 2000	reserved						

Appendix - Modbus/TCP Register Summary

Output, ACK and input flags

Output Coils (10001-10032)

	Bit Position															
Output Flags	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Output Coil #	Coil 16	Coil 15	Coil 14	Coil 13	Coil 12	Coil 11	Coil 10	Coil 9	Coil 8	Coil 7	Coil 6	Coil 5	Coil 4	Coil 3	Coil 2	Coil 1
Name	reserved	reserved	I/O 6	I/O 5	I/O 4	I/O 3	I/O 2	I/O 1	reserved	reserved	reserved	Ready	reserved	Error	Fail	Pass

	Bit Position															
ACK Flags	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Output Coil #	Coil 32	Coil 31	Coil 30	Coil 29	Coil 28	Coil 27	Coil 26	Coil 25	Coil 24	Coil 23	Coil 22	Coil 21	Coil 20	Coil 19	Coil 18	Coil 17
Name	reserved				-	-	-	-	-	-			reserved	Product Change Ack	Remote Teach Ack	Trigger Ack

Input Coils (00000-00015)

	Bit Position															
Input Reg 1	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input Coil #								Coil 9						Coil 3	Coil 2	Coil 1
Name	reserved	reserved	reserved	reserved	reserved	reserved	reserved	BCR String Change	reserved	reserved	reserved	reserved	reserved	Product Change	Remote Teach	Trigger