

DNP3 Slave Communications Drivers v1.01+

Information Sheet for Crimson v3.0+

Compatible Devices

DNP3 Serial or Ethernet master device.

Verified Device

Invensys/Foxboro SCD5200

Required Devices

A Red Lion Graphite HMI or Graphite Controller device is mandatory when using a DNP3 communications driver.

Overview

Red Lion provides serial and Ethernet DNP3 slave communications drivers to participate on a DNP3 network as a slave device. DNP3 support includes solicited and unsolicited events. Each event buffer is configurable for up to 32000 events.

Serial Port Configuration

In Crimson's Communications category select the desired serial port in the Communications tree and click on the Pick... button.

Communications Communications	Driver Selection Driver: No Driver Selected Pick	Devices
RS-252 Comms Port Network Protocol 1 Protocol 2 Protocol 3 Protocol 4 Generation of the second sec	Driver Picker for senal Port Manufacturer Baldor Bitotol Babcock BSAP Contrex Cruisair CTC CTI Danfoss DNP3 Dupline Eaton Eimo	
Sync Manager Mail Manager SQL Sync Comms Modules	OK Cancel Total of 172 Drivers Available.	

Select the DNP3 Slave communications driver as shown above and click OK.

Sk New - X	Driver Selection	n	Ø
The DS 232 Program Port	Driver: Dt	NP3 Slave	Devices
=(1) RS-485 Comms Port		1 INNI	Not Ma
RS-232 Comms Port - DNP3 Slave	Driver Settings		
m PLC1			
🖃 👎 Network	Source Num	nber: 2	
🌾 Protocol 1			
Protocol 2	Port Settings		
Protocol 3	David Data:	10300	
Trotocol 4	Daud Rate:	19200	
🖃 🖨 USB Host Ports	Data Bits:	Eight -	
Memory Stick			
📖 Keyboard	Stop Bits:	One 👻	
The Mouse	Devites	Nees	
🖃 🎒 Services	Parity:	None 👻	
Time Manager			i.

The Source Number setting will serve as an identifier for the Red Lion device on the DNP3 network. Set the Source Number to a number that does not currently exist on the network.

Modify the Baud Rate, Data Bits, Stop Bits and Parity as necessary to match the current settings of the DNP3 network.

Ethernet Port Configuration

In Crimson's Communications category select an available Protocol in the Network element of the Communications tree and click on the Pick... button.

Communications Communications R5-232 Program Port R5-485 Comms Port R5-232 Comms Port	Driver Selection Driver: No Driver Selected Driver Picker for Ethernet Port	Devices Total Modul Total Not Mi
Protocol 1 Protocol 1 Protocol 2 Protocol 4 VSB Host Ports Memory Stick Keyboard Mouse Services Time Manager QPC Proxy FTP Server	Manufacturer BACnet Banner Beckhoff Beta LaserMike Bristol Babcock BSAP Cognex CTI DNP3 Emerson - Control Techniques Emerson Process EtherNet/I/P EZ Automation	
Sync Manager Mail Manager SQL Sync Comms Modules	OK Cancel Total of 100 Drivers Available.	

Select the DNP3 IP Slave communications driver as shown above and click OK.

🕵 New - 🔀	Driver Selection	2
Communications		devices
■Q) RS-232 Program Port	Driver: DNP3 IP Slave Pick	🕀 🏢 Modu
📢 RS-485 Comms Port		Not M
RS-232 Comms Port	Driver Settings	
🖃 🐢 Network		
🖃 🏹 Protocol 1 - DNP3 Slave	Source Number: 2	
PLC1		
🌾 Protocol 2	Port Commands	
👸 Protocol 3	Databa Mahurah Data	
👸 Protocol 4	Delete Network Port	
🖃 🖨 USB Host Ports 🗏	Clear Port Settings	
Hemory Stick	Add Additional Device	

The Source Number setting will serve as an identifier for the Red Lion device on the DNP3 network. Set the Source Number to a number that does not currently exist on the network.

Next, select the PLC device and configure the IP Address, TCP Port and UDP Port as needed for the target DNP3 network.

	-		-	
	🕰 New 🗸 📉	Device Settings	-	P
1	🛃 Communications 🔺			devices
1	=() RS-232 Program Port	Enable Device: Yes 👻		🕀 🎆 Modul
	🛋 RS-485 Comms Port			Not M
1	📢 RS-232 Comms Port	Device Settings		
	🖃 👎 Network	Destination Montern 1	Ξ	
	Protocol 1 - DNP3 Slave			
	PLC1	IP Address: 192.168.1.101		
	Protocol 2			
Ш	🌾 Protocol 3	TCP Port: 20000		
	🌾 Protocol 4	UDB Ports 20000		
	🖃 🕰 USB Host Ports			

Also, ensure that the Red Lion device's Ethernet Port Settings are configured - please refer to the **NETWORK CONFIGURATION** section within the Crimson manual.

Device Settings

Select the PLC device in the Communications tree as shown below.

	Kew - X	Device Settings	^	Devices
1	C RS-232 Program Port	Enable Device: Yes 👻		🗄 🎆 Modul
i	=() RS-485 Comms Port			2 Not Mi
	RS-232 Comms Port	Device Settings		
		Destination Number: 1	E	
	PLC1	IP Address: 192.168.1.101		
	Protocol 2 Protocol 3	TCP Port: 20000		
	Frotocol 4	UDP Port: 20000		
1	Memory Stick	Connection Timeout: 5000 💮 ms		
i	Mouse	Transaction Timeout: 2000 ms		
	E Services	TCP Keep Alive: 30000 ms		
	OPC Proxy			

Set the Destination Number according to the DNP3 station number of the target device.

Crimson allows selection of Event Modes and Event Buffer Limits for each available data item associated with solicited events.

Navigation Pane	Communications - Networ	k - Protocol 1 - PLC1 Device 2 (
🙈 New 🗸 📉	Event Mode Configuratio	n
n Communications	Binary Input:	All Events
RS-232 Program Port		
=0 RS-485 Comms Port A	Double Binary Input:	All Events 🔻
-d) PS 485 Comms Port	Binary Output:	All Events 👻
Y Protocol 1 - DNP3 Slave	Counter:	Most Recent Event Only
PLC1	Frozen Counter:	All Events
🎸 Protocol 2	Analysis from the	
6 Protocol 3	Analog Input:	Most Recent Event Only
Protocol 4	Analog Output:	All Events 👻
Generation Strick		
Keyboard	Event Buffer Limits	
Mouse	Rinany Joputt	100
🖃 🎒 Services	binary input.	
Time Manager	Double Binary Input:	100
OPC Proxy	Rinany Output	100
ETP Server	billary Output.	
Sync Manager	Counter:	30
	Frazan Countar	30
Comms Modules	riozen councei.	
Slot 1	Analog Input:	30
Slot 2	Analog Output:	100
🖡 Slot 3	Analog Catpat.	
Slot 4	Event Buffer Full Mode	
	Retain: Oldest Even	ts 🔹
- 1 - 2 - 2 - 3 - 6 - 6 - 9 - 9 - 9 - 6 - 第 - 単	Device Commands	

Since Analog Input events can be "filtered" when coupled with an Analog Input Deadband value, Analog Input Events includes a "Current Value Only" mode setting.

Red Lion supports Event Buffer sizes up to 32000 events for each data item.

Lastly, the Retain option (Crimson 3.1+) allows the user to determine which events the event buffer will keep after exceeding the event buffer limit.

Data Access

Red Lion provides data access to the following items:

Data Item	DNP3 Object Group	DNP3 Event Group
Binary Inputs	1	2
Double-bit Inputs	3	4
Binary Outputs	10	11
Binary Outputs	12 – Latch ON/OFF only*	13
Counters	20	22
Frozen Counters	21	23
Analog Inputs	30	32
Analog Input Deadband	34	-
Analog Outputs	40	42
Analog Outputs	41	43

*Complementary latch point model only supported in Crimson 3.1+.



The following attributes and action items are available as indicated:

Current Value or Control – Represents the present value.

Flags – Bit mask indicating status. Bit 0 indicates online status and will automatically be sent to the master device. The remaining bit mask definition is as follows:

Binary items: Bit 1 – Restart Bit 2 – Communications Lost Bit 3 – Remote Forced Bit 4 – Local Forced Bit 5 – Chatter

Counters:	Bit 1 – Restart Bit 2 – Communications Lost Bit 3 – Remote Forced Bit 4 – Local Forced Bit 5 – Rollover
Analogs:	Bit 1 – Restart Bit 2 – Communications Lost Bit 3 – Remote Forced Bit 4 – Local Forced Bit 5 – Check Reference

Timestamp – The date and time associated with the last value change. Please use Crimson 3.0+ Time and Date format option using a Data Type of addrLongAsLong. Timestamps are read-only.

Class – Item used to assign the desired DNP3 class 0, 1, 2 or 3 for data items associated with events.

To access an attribute first create a tag within the Data Tags category.



l	🔏 New 🗸 🔀	Device Settings	
Ш	Communications		
Ш	RS-232 Program Port	Enable Device: Yes	▼
Ш	RS-485 Comms Port		
Ш	RS-232 Comms Port	Device Settings	
Ш	🖃 🐢 Network		
Ш	Protocol 1 - DNP3 Slave	Destination Number:	
Ш	PLC1	IP Address:	192.168.1.101
Ш	🏋 Protocol 😪 Add Block		
Ш	Protocol X Delete	TCP Port:	20000
Ш	Protocol	LIDP Port:	20000
Ш	🖃 🏟 USB Host Por 🎾 Find Usage 👘	0011010	
Ш	Memory S Rename	Connection Timeout:	5000 🚔 ms
Ш	Keyboard A rename		2000
Ш	() Mouse	Transaction Timeout:	2000 ms
Ш		TCP Keep Alive:	30000 ms
	Concentration and the second s		
	Line OPC Prove		

Next, create a gateway block. Right click on the PLC device and select Add Block.

Now select the newly added block and click the Pick... button in Block Settings.

New Communications One R5-232 Program Port R5-485 Comms Port	Block Settings Start Address: None Pick Pick
RS-232 Comms Port	Select Address for DNP3 Slave
Biockl Protocol 2 Protocol 2 Protocol 3 Protocol 4 WSB Host Ports WSB Host Ports Wemory Stick Weyboard Services Time Manager Wr OPC Proxy FIP Server Wail Manager Wail	eNone> No Selection BI Binary Inputs DBI Double-bit Binary Inputs BO Binary Outputs C Counters FC Frozen Counters AI Analog Input 64-bit Value AIDL Analog Input 64-bit Deadband AO Analog Outputs Data Type Winimum: Maximum Radio: OK Cancel

Select the desired Data Item, Data Type and Element then click OK.

<u>D</u> ata Item -			C Element	
<none> BI DBI BO C FC AI AID AID AID AO Data <u>Type</u></none>	No Selection Binary Inputs Double-bit Binary Inputs Binary Outputs Counters Frozen Counters Analog Inputs Analog Inputs Analog Input 64-bit Value Analog Input 64-bit Value Analog Outputs		AI 00010 0-CurrentV: Details Type: Worr Minimum: AI000 Maximum: AI655 Radix: Decir	d 000:CurrentValue 335:CurrentValue nal
Word as V Long as L Real as Re	Word ong ral	* *		

Set the Block Size in Block Settings to the desired size.

S New - X		Block Settings	
Communications	~	-	
RS-232 Program Port		Start Address:	AI00010:CurrentValue Pick
RS-485 Comms Port		Plask Circu	
RS-232 Comms Port		DIOCK SIZE:	
🖃 👎 Network		Direction:	G09 to Device
🖃 🍹 Protocol 1 - DNP3 Slave			
E I PLC1		Tag Data:	Use Scaled Values 🔹
🖃 🥥 Block1			
AI00010:CurrentValue		Update Policy:	Automatic
🚏 Protocol 2	=	Undate Period:	500 ms
👔 Protocol 3		apaster crown	

Map the created tag to the block element.

Accessing 64-bit Values:

Access to 64-bit double values is possible by using data arrays in conjunction with user functions provided in Crimson 3.0+.

The array selection is available in each tag.

Source ✓ Analogin ✓ Analogin ✓ All0 Source:		Data Format Colors Alarms Triggers Plot Security
Source:	😼 Data Tags	Data Source
		Source: VInternal
Extent: Array 2	1	Extent: Z
Manipulation: None		Manipulation: None

Simply map each parameter of type double to a numeric tag array.



Then use the following user functions to get and set double values, respectively.

cstring AsTextR64(Data)

Where Data is the first element in the array of the double value that will be passed as a string.

🍕 New 🔹 🛱 🔀 🖉	D	ata Format	Colors Secur	rity	
🔩 Data Tags 🔣 Reboot	D	ata Source —			
AnalogIn DeubleFleat		Source:	🔻 General	AsTextR64(AnalogIn.AI10[0])	E
AS D1		Extent:	🔻 One Item		
AB D2 AB D3		Length:	16	, characters	
AB D4		Packing:	None	•	
		Access:	Read Only		

void TextToR64(Input, Output)

Where Input is a string representing a double value and Output is the first element in the array of the double value to be set.

Note: Other 64-bit math functions are also available. Please review the Crimson 3.0 Reference Manual.

Events

Unsolicited Events will be sent upon a change in value of a data item provided:

- 1) The master device has enabled unsolicited messages.
- 2) Either the master or the user has assigned a non-zero class to that data item.

Solicited Events will be sent upon a Report By Exception (RBE) or a Change Event request from the master device for DNP3 data items set to a non-zero class according to the mode and buffer limit configured in the Device Settings. The event buffer is cleared or reset upon each response to an event request. If the number of events have reached the Event Buffer Limit prior to an event request events are lost according to the Retain device setting and the master device will be notified in the response to the next event request.

Analog Input Events

Analog Input Events may be "filtered" or reduced by using an Analog Input Deadband value. The Analog Input Deadband must be of the same index and type as the Analog Input producing the event. When the Analog Input Deadband is set to a non-zero value the associated Analog Input will only report an event when the change in value is greater than the deadband value.

Revision History

02/12/18 – Created 01/28/19 – Added Retain device option notes, Object 12 Latch ON/OFF support only. 01/28/19 – Added DNP3 Event Group info.