Tel +1 (717) 767-6511
Fax +1 (717) 764-0839
www.redlion.net

Emerson Process ROC Protocol Enhanced Master Driver v3.0

Information Sheet for Crimson v3.0+

Compatible Devices

All Emerson Process devices supporting ROC or ROC Plus protocols.

Verified Device

ROC827L (Please note that driver is not limited to ROC800 devices.)

Overview

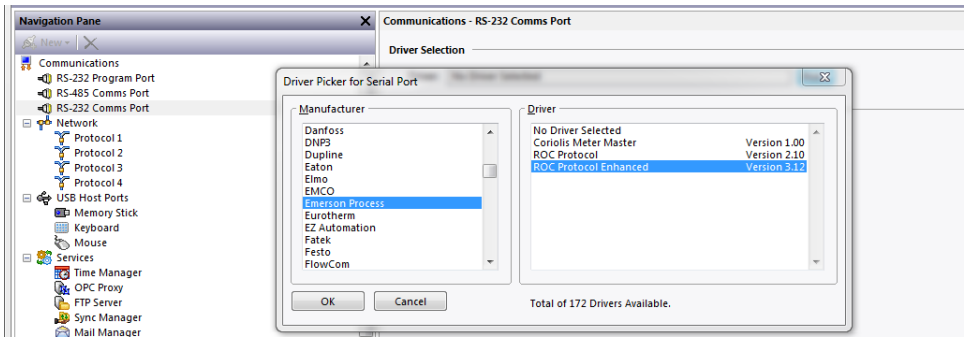
The Emerson Process ROC Protocol Enhanced Master Driver provides a simple UI with few limitations. User Defined Parameters allow the user to define any point type in any Emerson Process device utilizing the ROC protocol. Predefined point types exist and are configurable according to the target device as described later in this document.

An Ethernet version of the driver is available in Crimson 3.0 Build 693+ in that virtual ports are no longer required for Ethernet communications.

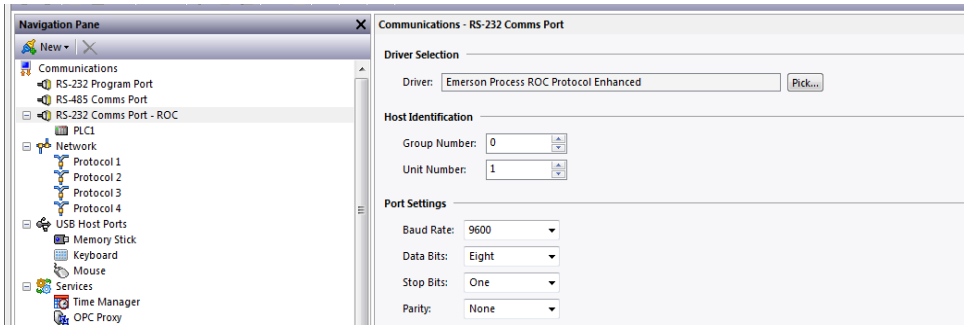
Please review the following information to achieve successful communications.

Serial Port Configuration

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



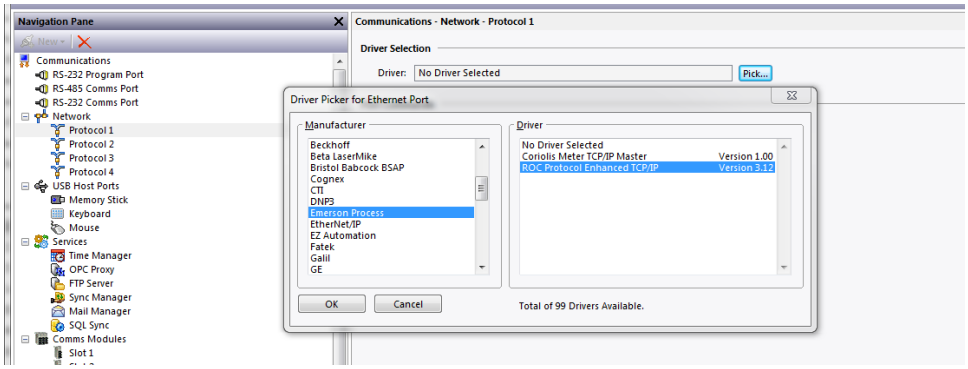
Find the Emerson Process ROC Protocol Enhanced communications driver as shown above and click OK.



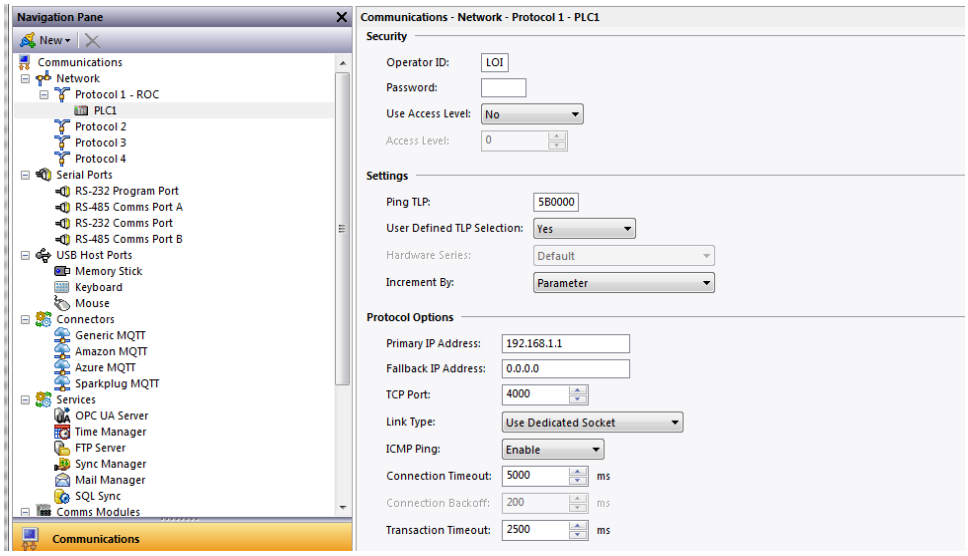
Modify the Baud Rate, Data Bits, Stop Bits and Parity settings such that it mirrors the port settings in the ROCLINK 800 software.

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.



Find the Emerson Process ROC Protocol Enhanced TCP/IP communications driver as shown above and click OK. Next select the PLC device and configure the IP address and the TCP Port such that is matches the configuration in the ROCLINK 800 software.

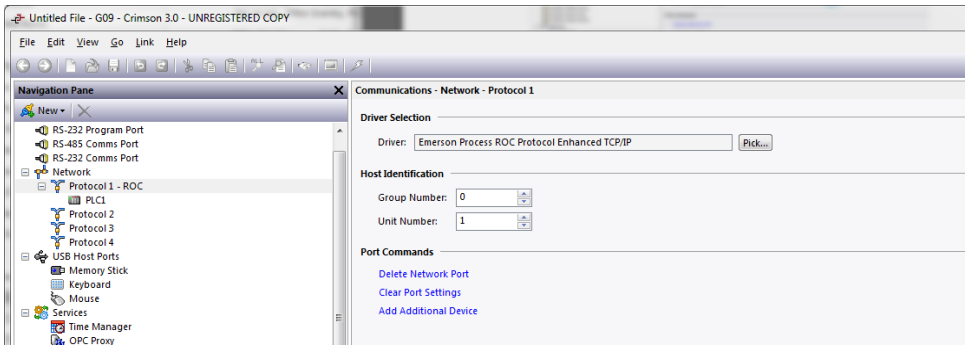


Note - Only configure the Fallback IP Address (C3.1+ only) if there is a secondary ROC IP address for redundancy communications.

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

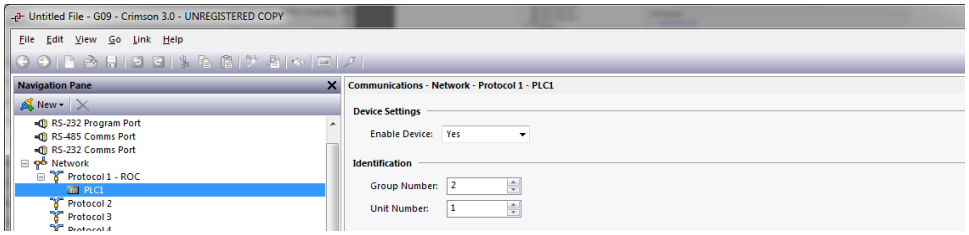
Device/Host Identification

Correct identification is essential for successful communications. Crimson provides identification fields for Group and Unit Numbers on a host and a device level. In Crimson's Communications category, select the ROC communications driver in the Communications tree.



Set the Group Number and Unit Number in the Host Identification group such that it will properly identify the Red Lion device on the ROC protocol network.

Next, select the PLC device and set the Group Number and Unit Number such that it reflects the settings in the target ROC device.



Device User Access

Device configuration access is provided to the Red Lion device's UI by using the DevCtrl function:

INT **DEVCTRL(**DEVICE, FUNCTION, DATA**)**

For DEVICE use the Device Number shown in Crimson's lower Toolbar when the ROC Device is selected in the Communications tree.

For FUNCTION reference the codes below.

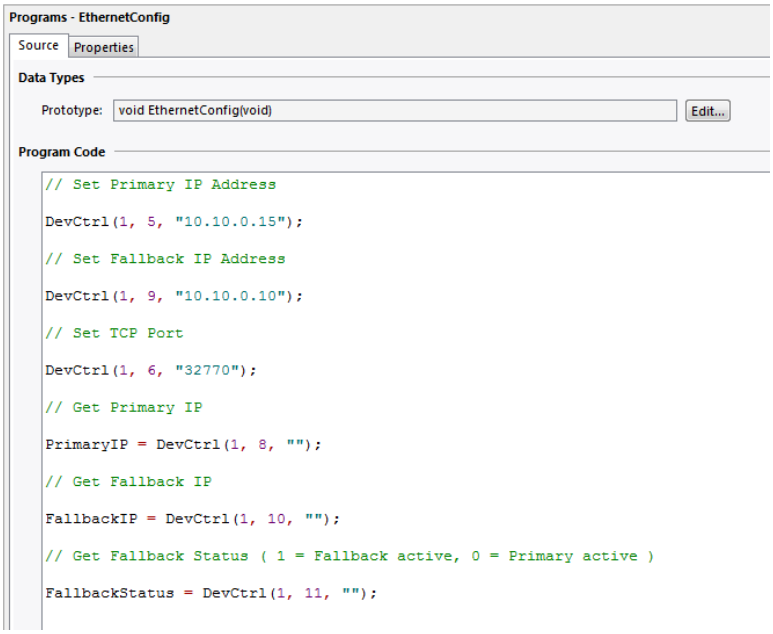
Function Code	Operation Performed
1	Set Group Number
2	Set Unit Number
3	Get Group Number
4	Get Unit Number
5 *	Set Primary IP Address
9 *	Set Fallback IP Address
6 *	Set TCP Port
8 *	Get Primary IP Address
10 *	Get Fallback IP Address
11 *	Get Fallback Status (1 = Fallback active, 0 = Primary active)

*Crimson 3.1+ only

DATA is defined as a string containing write data.

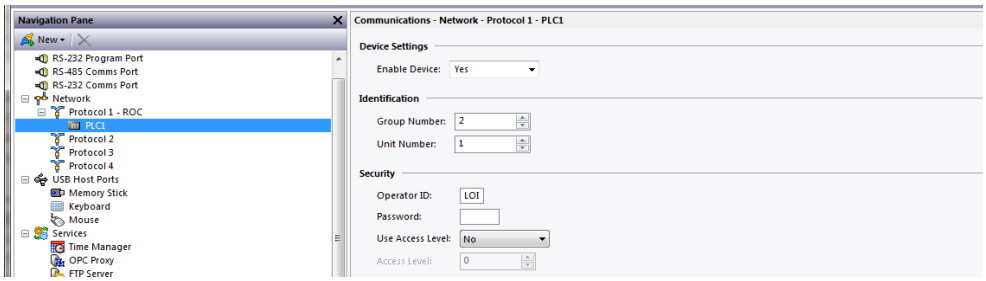
Note returned data is always a number.

For demonstration purposes consider the following functions within a user program accessing Device Number 1:



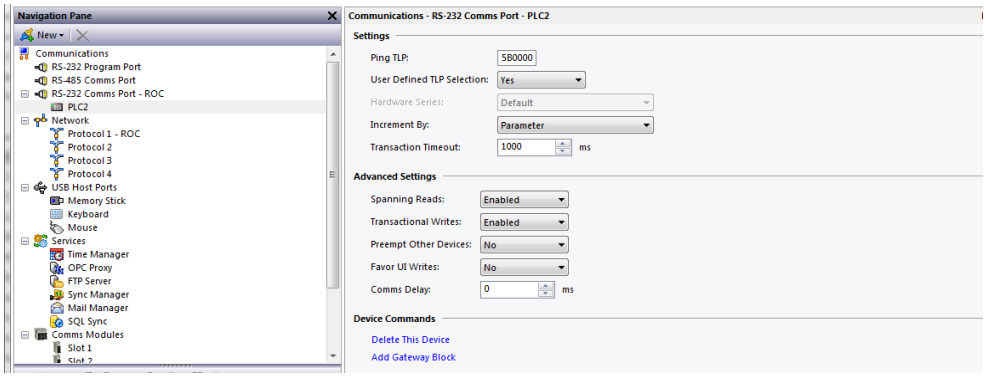
Device Configuration

Crimson provides a Security area within the device configuration.



Please specify the Operator ID and Password that the Red Lion device should use when communicating with the ROC device. Also, indicate the Access Level if any.

Review the Settings group within the device configuration for each device.



The first field provides the ability to select a Ping TLP. This TLP should contain only 1 byte of data (UINT8) and should always be available in the target device. Enter this value in the format of TTLLPP where TT is the Point Type, LL is the Logical Number and PP is the parameter in hexadecimal form.

By default, Crimson offers a TLP selection dialog box that allows simple input of the Point Type, Logical Number, Parameter Number and data type for each value. If a "predefined" TLP selection dialog box is required, select "No" for the User Defined TLP Selection field. The predefined TLP selection will then be based upon the Hardware Series selection. Please refer to the Currently Available Predefined Point Types section for list of currently available predefined point types.

The Increment By field in the settings section allows the user to choose whether to increment by parameter or logical number. The correct setting here is useful when using the smart duplicate tag function or data arrays. When using data arrays consider setting this parameter to "Logical Number" as all array elements are guaranteed to be of the same data type. It is recommended that this setting be configured before tags are mapped to this device. In the event that both Increment methods will be useful for a single application, it is possible to create

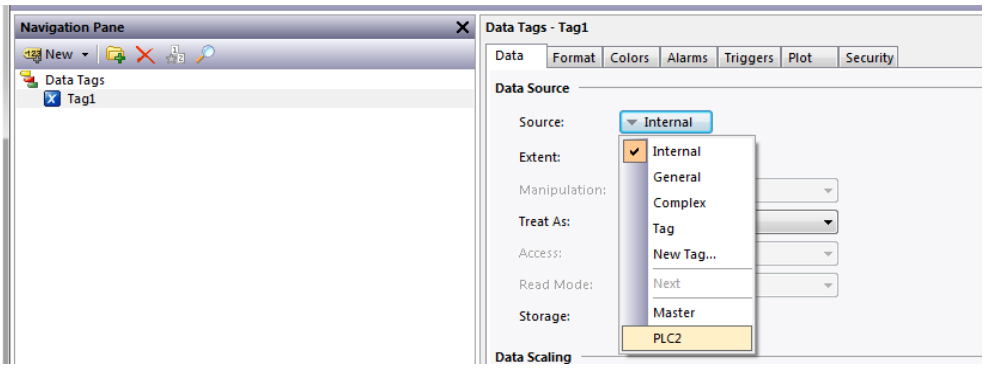
two identical devices for the Emerson Process ROC Protocol Enhanced driver with only the Increment By parameter set uniquely. Note this setting may also have an impact on internal Crimson communications blocks. Please refer to the Register Mapping section for more details.

Note that when communicating with a remote ROC device using Network Radio Modules (NRM), it may be necessary to increase the transaction timeout from the default value for reliable communications.

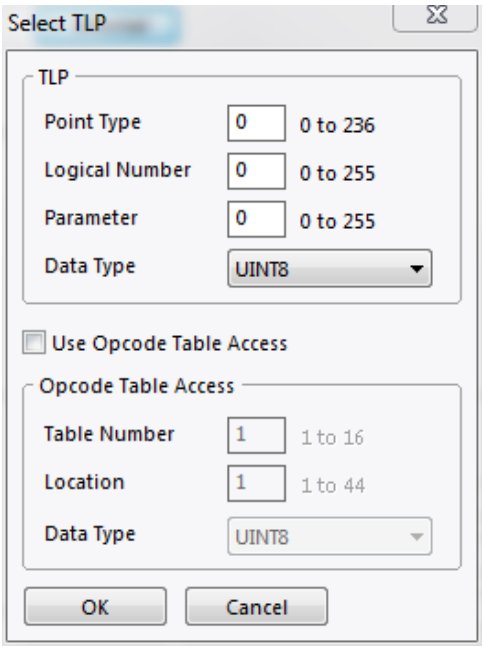
Disabling "Spanning Reads" in the Advanced Settings may be useful as the system will always attempt to optimize communications.

Accessing Data

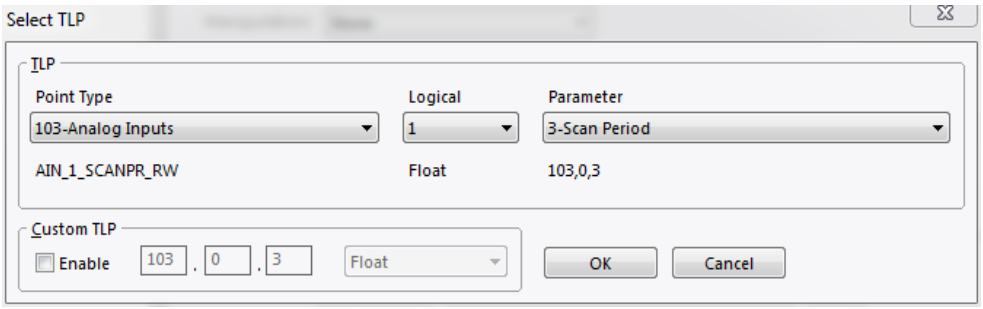
The "Select TLP" dialog box can be found by selecting the device representing the ROC device in the Source drop down box of a Tag created in the Data Tag category in Crimson.



The TLP selection dialog box allows simple input of the Point Type, Logical Number, Parameter Number and data type for each value. Additionally Opcode Table Access can be configured.



If a predefined TLP selection is required, select "No" for the User Defined TLP Selection field in the device options of Crimson.

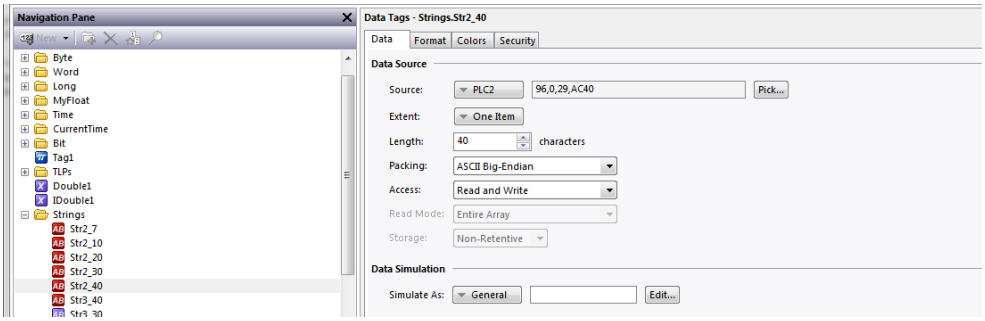


The predefined TLP selection will then be based upon the Hardware Series selection — see below for list of currently available predefined point types.

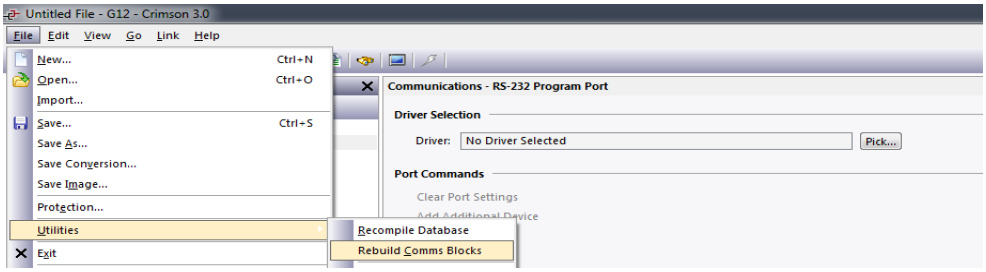
Please review the following notes for successful data access.

Data types of type "TLP" should be assigned to a numeric data tag and should be interpreted as follows: XXTTLLPP, where XXTTLLPP is an eight digit hexadecimal number. TT is the Point Type, LL is the Logical Number and PP is the Parameter Number.

When accessing items with a data type of "String", the item should be assigned to a string tag and the tags Packing should be set to ASCII Big-Endian. Since packing is used, the string length must be set to the selected text length or the selected text length + 2 when the selected text length is not divisible by 4.

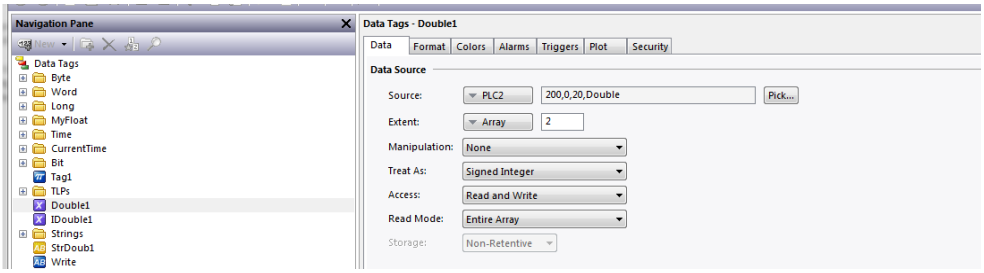


If the string tag is not initially set to the proper length, the communication blocks may need to be rebuilt. This can be accomplished by running the Rebuild Comms Blocks utility available in Crimson's File->Utility menu.



Take care when writing to string items. In the event that the current string value contains the same first four or more characters as the desired string value, clear the string before writing the desired text.

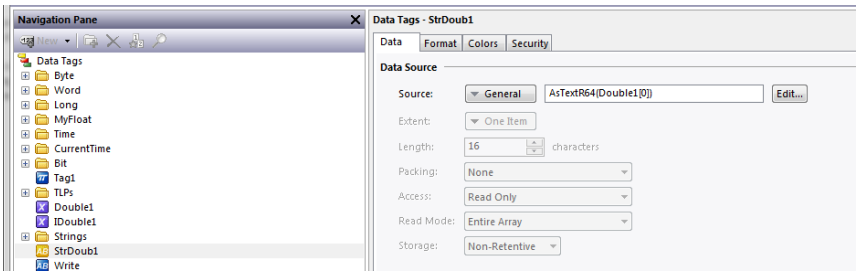
Access to 64-bit double values is possible by using data arrays in conjunction with user functions provided in Crimson 3.0+. Simply map all parameters of type double to a numeric tag array. The array selection is available in each tag.



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

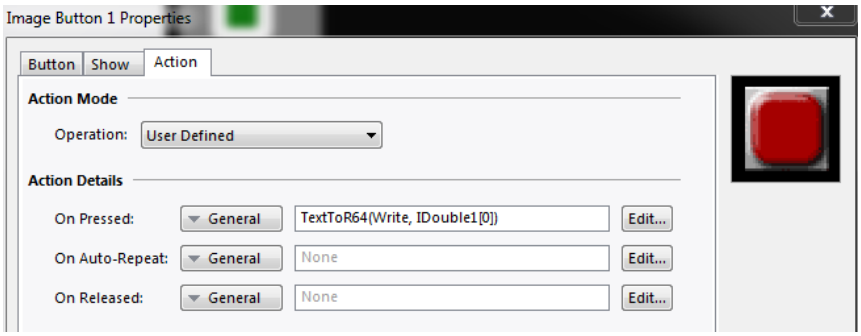
cstring AsTextR64(Data)

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



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.

Please use Crimson's Time and Date primitive when displaying the target devices Current Time (Parameter 8 of Point Type 12, Parameter 7 of Point Type 136) or any other Time data type.

Register Mappings

This driver maintains a list for TLP's of double and string data types as well as opcode table data. Crimson's communications system handles the remaining data types where TLP's are coalesced into communications blocks. The latter operation requires TLP register mappings to be consistent in that the distance from one mapping to the next is the least possible. This is crucial in the prevention of exceeding the maximum (1000) communications blocks in databases consisting of many register mappings.

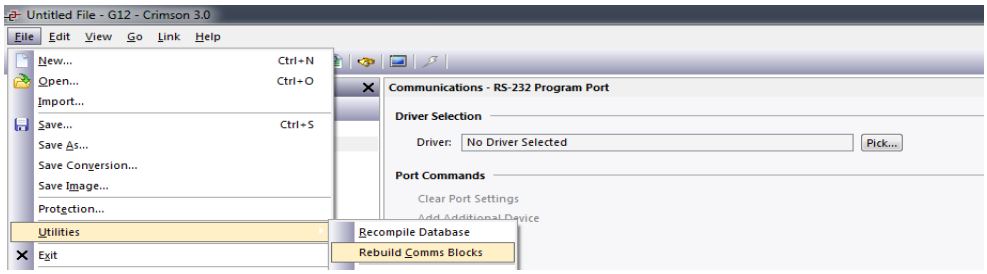
Based on this information the programmer should select the best selection for the "Increment By" field in the "Settings" group of the device options in Crimson. Refer to the Device Configuration section for an overview.

In consideration of a ROC TLP in the form of TT.LL.PP, where TT is the Point Number, LL is the Logical Number and PP is the Parameter.

Setting Increment By to Parameter will result in a hexadecimal mapping of 0xTTLLPP. Use this setting when accessing near consecutive Parameters of the same Logical Number.

Likewise setting Increment By to Logical Number will result in a hexadecimal mapping of 0xTTPPLL. This setting is most useful when accessing the same Parameters of near consecutive Logical Numbers.

In the evolution of a database, it may be necessary to rebuild Crimson's communications blocks. This can be accomplished by running the Rebuild Comms Blocks utility available in Crimson's File->Utility menu.



This action is most useful when changing the Increment By field at mid-development or to optimize communications.

Currently Available Predefined Point Types (by Device)

Default Device

0-Configurable Opcode	101-Discrete Inputs
1-Discrete Inputs	102-Discrete Outputs
2-Discrete Outputs	103-Analog Inputs
3-Analog Inputs	104-Analog Outputs
4-Analog Outputs	105-Pulse Inputs
5-Pulse Inputs	108-Multivariable Sensor
7-AGA Flow Parameters	109-System Analog Inputs
8-History Parameters	110-PID Control Parameters
10-AGA Flow Calculation Values	113-Orifice Meter Run Configuration
12-Clock	114-Orifice Meter Run Values
13-Flags	115-Turbine Meter Run Configuration
15-System Variables	116-Turbine Meter Run Values
16-FST Registers	122-DS800 Configuration
17-Soft Point Parameters	123-Security Group Configuration
19-Database Parameters	124-History Segment Configuration
21-Information for User Defined Points 1	125-History Segment 0 Point Configuration
41-Run Parameters	136-ROC Clock
42-Extra Run Parameters	137-Internet Configuration Parameters
43-User List Parameters	138-User Program Configuration
44-Power Control Parameters	139-Smart IO Module Information
45-Meter Calibration and Sampler	140-AC Input Output Module
46-Meter Configuration Parameters	200-Liquid Preferences
47-Meter Flow Values	201-Liquid Products
48-PID Control Parameters	202-Density Interface
98-Soft Point Parameters	203-Liquid Station
99-Configurable Opcode	204-Liquid Meters
100-Power Control Parameters	

Floboss 103/104 Device

0-Configurable Opcode	40-Mulitple Variable Sensor
1-Discrete Inputs	41-Run Parameters
2-Discrete Outputs	42-Extra Run Parameters
3-Analog Inputs	43-User List Parameters
4-Analog Outputs	44-Power Control Parameters
5-Pulse Inputs	45-Meter Calibration and Sampler
6-PID Parameters	46-Meter Configuration Parameters
7-AGA Flow Parameters	47-Meter Flow Values
8-History Parameters	48-PID Control Parameters
9-AGA Switched Run Parameters	52-Battery Parameters
10-AGA Flow Calculation Values	53-Modbus Configuration Parameters
11-Tanks	54-Modbus Function Tables
12-Clock	55-Modbus Special Function Table
13-Flags	56-Analog Input Calibration Parameters
14-Comm Ports	57-Keypad/Login Securities Parameters
15-System Variables	58-Revision Information
16-FST Registers	59-Program Flash Control Parameters
17-Soft Point Parameters	81-Logic Alarm Parameters
19-Database Parameters	83-User Analog Values
21-Information for User Defined Points	84-User Discrete Values

ROC800 Device

82-Virtual Discrete Outputs	120-Mobus Master Modem Configuration
84-HART Extended Point Type	121-Modbus Master Table
85-HART Point Type	122-DS800 Configuration
91-System Variables	123-Security Group Configuration
92-Logon Parameters	124-History Segment Configuration
93-License Key Information	125-History Segment 0 Point Config
94-User C++ Configuration	126-History Segment 1 Point Config
95-Comm Ports	127-History Segment 2 Point Config
96-FST Parameters	128-History Segment 3 Point Config
97-FST Register Tags	129-History Segment 4 Point Config
98-Soft Point Parameters	130-History Segment 5 Point Config
99-Configurable Opcode Table	131-History Segment 6 Point Config
100-Power Control Parmeters	132-History Segment 7 Point Config
101-Discrete Inputs	133-History Segment 8 Point Config
102-Discrete Outputs	134-History Segment 9 Point Config
103-Analog Inputs	135-History Segment 10 Point Config
104-Analog Outputs	136-ROC Clock
105-Pulse Inputs	137-Internet Configuration Parameters
106-RTD	138-User C++ Host Parameters
107-Thermocouple	139-Smart I/O Module Information
108-Multi-Variable Sensor	140-AC Input Output
109-System Analog Inputs	141-Advance Pulse Module
110-PID Control Parameters	142-History Segment 11 Point Config
111-Sampler/Odorizer Parameters	143-History Segment 12 Point Config
112-Station Parameters	144-Transactional History Config
113-Orifice Meter Run Configuration	145-Transactional History Point Config
114-Orifice Meter Run Values	172-RTU Network Discovery Lst Point Type
115-Turbine Meter Run Configuration	173-Network Commissioned Lst Point Type
116-Turbine Meter Run Values	174-Network Export Data
117-Modbus Configuration Parameters	175-Network Import Data
118-Modbus Register to TLP Mapping	176-IEC62591 Live List Parameters
119-Modbus Event, Alarm, and History	177-IEC62591 Commissioned List Params

ROC800L Device

82-Virtual Discrete Outputs	129-History Segment 4 Point Config
84-HART Extended Point Type	130-History Segment 5 Point Config
85-HART Point Type	131-History Segment 6 Point Config
91-System Variables	132-History Segment 7 Point Config
92-Logon Parameters	133-History Segment 8 Point Config
93-License Key Information	134-History Segment 9 Point Config
94-User C++ Configuration	135-History Segment 10 Point Config
95-Comm Ports	136-ROC Clock
96-FST Parameters	137-Internet Configuration Parameters
97-FST Register Tags	138-User C++ Host Parameters
98-Soft Point Parameters	139-Smart I/O Module Information
99-Configurable Opcode Table	140-AC Input Output
100-Power Control Parmeters	141-Advance Pulse Module
101-Discrete Inputs	142-History Segment 11 Point Config
102-Discrete Outputs	143-History Segment 12 Point Config
103-Analog Inputs	144-Transactional History Config
104-Analog Outputs	145-Transactional History Point Config
105-Pulse Inputs	172-RTU Network Discovery Lst Point Type
106-RTD	173-Network Commissioned Lst Point Type
107-Thermocouple	174-Network Export Data
108-Multi-Variable Sensor	175-Network Import Data
109-System Analog Inputs	176-IEC62591 Live List Parameters
110-PID Control Parameters	177-IEC62591 Commissioned List Params
111-Sampler/Odorizer Parameters	200-Liquid Preferences
112-Station Parameters	201-Liquid Products
113-Orifice Meter Run Configuration	202-Density Interface
114-Orifice Meter Run Values	203-Liquid Station
115-Turbine Meter Run Configuration	204-Liquid Meters
116-Turbine Meter Run Values	205-Liquid Meters Extended
117-Modbus Configuration Parameters	206-Prover Configuration
118-Modbus Register to TLP Mapping	207-Prover Trial Report
119-Modbus Event, Alarm, and History	208-Prover Final Report
120-Mobus Master Modem Configuration	210-Batch Station Configuration
121-Modbus Master Table	211-Station Current Batch
122-DS800 Configuration	212-Station Batch History
123-Security Group Configuration	213-Meter Current Batch
124-History Segment Configuration	214-Meter Batch History
125-History Segment 0 Point Config	215-Station Batch Queue Configuration
126-History Segment 1 Point Config	216-Station Batch Queue
127-History Segment 2 Point Config	219-Reporting Program
128-History Segment 3 Point Config	

Floboss 107 Device

0-Configurable Opcode	55-Modbus Special Function Table
1-Discrete Inputs	56-Analog Input Calibration Parameters
2-Discrete Outputs	57-Keypad/Login Securities Parameters
3-Analog Inputs	58-Revision Information
4-Analog Outputs	59-Program Flash Control Parameters
5-Pulse Inputs	80-Ethernet/USB Configuration Parameters
8-History Parameters	81-Logic Alarm Parameters
9-AGA Switched Run Parameters	83-User Analog Values
11-Tanks	84-User Discrete Values
12-Clock	85-HART Point Type
13-Flags	86-Extended History Parameters
14-Comm Ports	88-BLM User List Parameters
15-System Variables	89-Chart User List Parameters
16-FST Registers	93-License Key Information
17-Soft Point Parameters	94-User C++ Configuration
19-Database Parameters	98-Extended Soft Point Parameters
20-Diagnostic Parameters	117-Modbus Configuration Parameters
40-Mulitple Variable Sensor	118-Modbus Register to TLP Mapping
43-User List Parameters	120-Mobus Master Modem Configuration
44-Radio Power Control Parameters	121-Modbus Master Table
45-Meter Calibration and Sampler	122-DS800 Control and Diagnostics
46-Meter Configuration Parameters	172-RTU Network Discovery Lst Point Type
47-Meter Flow Values	173-Network Commissioned Lst Point Type
48-PID Control Parameters	174-Network Export Data
52-Battery Parameters	175-Network Import Data
53-Modbus Configuration Parameters	176-IEC62591 Live List Parameters
54-Modbus Function Tables	177-IEC62591 Commissioned List Params

Floboss 407 Device

0-Configurable Opcode	36-Host Configuration - COMM 1
1-Discrete Inputs	37-Modbus Configuration -COMM 2/LOI
2-Discrete Outputs	38-Function Configuration -COMM 2/LOI
3-Analog Inputs	39-Host Configuration - COMM 2/LOI
4-Analog Outputs	40-Mulitple Variable Sensor
5-Pulse Inputs	41-Run Parameters
6-PID Parameters	42-Extra AGA Run Parameters
7-AGA Flow Parameters	43-User List Parameters
8-Standard History Parameters	44-Radio Power Control Parameters
9-Local Display Panel Parameters	45-Meter Calibration and Sampler
10-AGA Flow Calculation Values	46-Meter Configuration Parameters
11-Tank Parameters	47-Meter Flow Values
12-ROC Clock Parameters	48-PID Control Parameters
13-System Flags	52-Battery Parameters
14-Comm Ports	53-Modbus Configuration Parameters
15-System Variables	54-Modbus Function Tables
16-FST Registers	55-Modbus Special Function Table
17-Soft Point Parameters	56-Analog Input Calibration Parameters
19-Database Parameters	57-Keypad/Login Securities Parameters
20-ROC Tasks	58-Revision Information
21-Information for User Defined Points	59-Program Flash Control Parameters
32-Modem Configuration -COMM 1	81-Logic Alarm Parameters
33-Modem Configuration -COMM 2/LOI	83-User Analog Values
34-Modbus Configuration -COMM 1	84-User Discrete Values
35-Function Configuration -COMM 1	

Floboss 500 Series Device

0-Configurable Opcode	40-Mulitple Variable Sensor
1-Discrete Inputs	41-Run Parameters
2-Discrete Outputs	42-Extra AGA Run Parameters
3-Analog Inputs	43-User List Parameters
4-Analog Outputs	44-Radio Power Control Parameters
5-Pulse Inputs	45-Meter Calibration and Sampler
6-PID Parameters	46-Meter Configuration Parameters
7-AGA Flow Parameters	47-Meter Flow Values
8-Standard History Parameters	48-PID Control Parameters
9-Local Display Panel Parameters	52-Battery Parameters
10-AGA Flow Calculation Values	53-Modbus Configuration Parameters
11-Tank Parameters	54-Modbus Function Tables
12-ROC Clock Parameters	55-Modbus Special Function Table
13-System Flags	56-Analog Input Calibration Parameters
14-Comm Ports	57-Keypad/Login Securities Parameters
15-System Variables	58-Revision Information
16-FST Registers	59-Program Flash Control Parameters
17-Soft Point Parameters	81-Logic Alarm Parameters
19-Database Parameters	83-User Analog Values
21-Information for User Defined Points	84-User Discrete Values

ROC 300 Series Device

0-Configurable Opcode	35-Function Configuration -COMM 1
1-Discrete Inputs	36-Host Configuration - COMM 1
2-Discrete Outputs	37-Modbus Configuration -COMM 2/LOI
3-Analog Inputs	38-Function Configuration -COMM 2/LOI
4-Analog Outputs	39-Host Configuration - COMM 2/LOI
5-Pulse Inputs	40-Mulitple Variable Sensor
6-PID Parameters	41-Run Parameters
7-AGA Flow Parameters	42-Extra AGA Run Parameters
8-Standard History Parameters	43-User List Parameters
9-Local Display Panel Parameters	44-Radio Power Control Parameters
10-AGA Flow Calculation Values	45-Meter Calibration and Sampler
11-Tank Parameters	46-Meter Configuration Parameters
12-ROC Clock Parameters	47-Meter Flow Values
13-System Flags	48-PID Control Parameters
14-Comm Ports	52-Battery Parameters
15-System Variables	53-Modbus Configuration Parameters
16-FST Registers	54-Modbus Function Tables
17-Soft Point Parameters	55-Modbus Special Function Table
18-Analog Input Calibration Parameters	56-Analog Input Calibration Parameters
19-Database Parameters	57-Keypad/Login Securities Parameters
20-ROC Tasks	58-Revision Information
21-Information for User Defined Points	59-Program Flash Control Parameters
32-Modem Configuration -COMM 1	81-Logic Alarm Parameters
33-Modem Configuration -COMM 2/LOI	83-User Analog Values
34-Modbus Configuration -COMM 1	84-User Discrete Values

Cable Information

Serial

G3 RS232 Port	FloBoss 103 LOI Port
2 - Rx	Tx
5 - Tx	Rx
3,4 - Common	5 - Common

G3 RS232 Port	ROC800 CPU RS232C COM2 Port
2 – Rx	2 - Tx
5 - Tx	1 - Rx
3,4 - Common	5 - Common

Ethernet

Standard Ethernet Cable

Revision History

08/16/12 – Created
08/27/12 – Updated string data access notes.
09/11/12 – Added User Defined TLP selection.
10/12/12 – Added list of predefined point types.
10/18/12 – Clarified "Compatible Devices" and "Verified Device" sections.
07/01/13 – Updated string data access notes.
01/27/14 – Updated list of predefined point types.
01/30/15 – Added note on timeout when using NRMs.
02/03/15 – Added "Spanning Reads" and "Purge, Sort and Rebuild" notes.
07/25/16 – Added Ethernet driver.
02/08/18 – Added Register Mapping notes.
02/13/18 – Updated to new format.
09/05/18 – Added Fallback IP Address and Device User Access section.