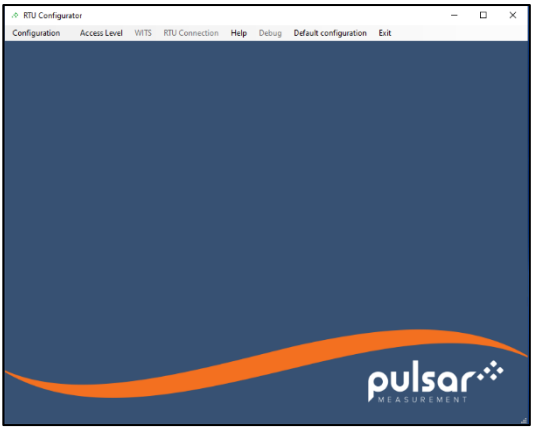

DNP3 Configurator

Instruction Manual

DNP3 CONFIGURATOR (SECOND EDITION REV 1)

November 2024

Part Number M-DNP-3-002-1P

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CONTENTS

CHAPTER 1: START HERE...

About this Manual

It is important that this manual is referred to for correct operation.

This manual has been written for people who need to use a DNP3 configuration (.xml file) to load onto an Ultimate controller.

In producing this manual, it has been assumed that the reader has some experience of communication protocols and is familiar with the Pulsar range of instruments.

***Disclaimer**: Pulsar accepts no responsibility for any loss or damage caused by the misapplication of the information contained in this document.*

Tips

TIP: Look for this icon throughout your Pulsar Measurement manual to find helpful information and answers to frequently asked questions.

Additional Information

Additional Information

At various parts of the manual, you will find sections like this that explain specific things in more detail.

CHAPTER 2 ULTIMATE IMPORT/EXPORT XML FILES

Overview

The configuration of the RTU is stored as a file called rtucongig.xml. This file can be read from the Pulsar PC configuration DNP3 configurator. Changes can be made in the software and saved back into an xml file, which is a proprietary format, ready to be programmed into the Ultimate.

Creating an XML file using the Ultimate

To make changes to the RTU via the Ultimate controller, you must first have a profile (program) setup in Ultimate. Or to create a new xml file to export, you will first need to create a profile on Ultimate.

Enter program mode by pressing the 

button and keying in the passcode **1997**.

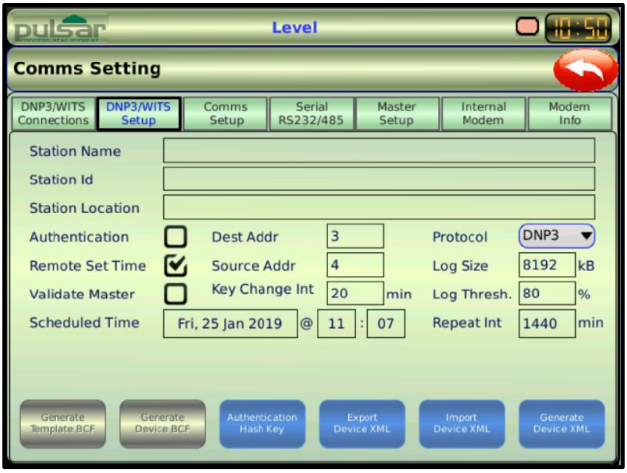
Now select the Advanced Config menu option  where you will see a new screen appear for the menu options now available.

From the menu options available please select the communication option  , and once selected you will now see the Comms Setting screen as shown below:

Creating and exporting an xml file

To create and export an xml file you would first need to setup your profile and return to run mode, so that the changes made are conveyed to the Ultimate's RTU correctly.

Ensure that the external SD card is placed into its slot correctly. Return to program mode and back to the Advanced Configuration menu and choose the Communications menu option. Select the DNP3/WITS Setup tab in the Comms Setting screen and you should now see the screen below (example shown below does not have any customer settings programmed in):



To export the xml file to the SD card, press the 

button to begin the export process to the SD card. The file will be saved on the SD card as an rtu.xml file on to the SD card, which can be used to set up another Ultimate or read and changed using the Pulsar DNP3 software.

Important Information

Prior to exporting the xml file, the Ultimate will need to be returned to run mode to convey all new changes to the Ultimate RTU. Once completed return to program mode and export the xml file.

Importing an xml file using Ultimate

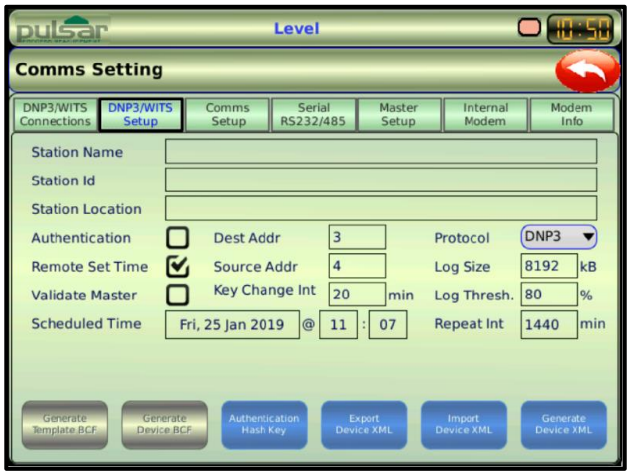
This is done in the same way as exporting an xml file. To import an xml file, you must have the file created by the Pulsar DNP3 software configuration software or from another Ultimate Controller.

Insert the SD card into the Ultimate and Enter program mode by pressing the 

button and keying in the passcode **1997**.

Navigate to the Advanced Config menu option  where you will see a new screen appear for the menu options now available.

From the menu options available please select the communication option  , and once selected you will now see the Comms Setting screen. Select the DNP3/WITS Setup tab in the comms setting screen.

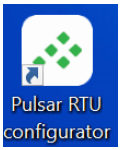


Pressing the 

button will allow you to import a DNP3 configuration file from the SD Card. When prompted to do so select the file you wish to import and press '**Import**'. When the import has finished, return to run mode for the changes to take place.

CHAPTER 3 USING PULSAR DNP3 PC SOFTWARE

Installing the DNP3 Configurator software

The DNP3 Configurator software can be downloaded directly from the Pulsar Measurement website:
https://pulsarmeasurement.com/downloads/software/
When the software has downloaded a shortcut icon will be placed on to your PC's desktop: 

. Double click on this icon to open the software, and when prompted to enter the passcode **1997**.

The software will open, and you will be met with the following screen:

Software menu options

Configuration

This menu option allows you to select what protocol you are communicating in and the ability to open and save files.

WITS/DNP3

Selecting this option will allow you to open and edit files for either DNP3 or WITS (***only DNP3 is available***)

Open

Selecting this menu will allow options to open, upload or import different file types to view and edit on the software.

Open xml

This option allows you to open an xml file that is saved on to your local PC or from an SD card inserted into your PC from an Ultimate.

Save

This function allows the user the ability to save an xml to file to the local PC or to an SD card. Or directly to the RTU of the Ultimate.

Save xml

Select this to save the current configuration as an xml file to the local PC or SD card, ready to be imported on to an Ultimate Controller.

Access Level

Selecting this option allows you to view the current access level you are in. Any change to the access level should only be carried out when consulting a Pulsar engineer.

Help

Selecting this option opens a window, displaying the current version of the DNP3 Configurator software and Pulsar's Copyright statement.

Default configuration

This allows the user to pick a general defaulted configuration xml file (nothing setup). Or a 2-pump configuration xml file.

Exit

Selecting this option will close the PC Software down.

Importing an xml file from the Ultimate

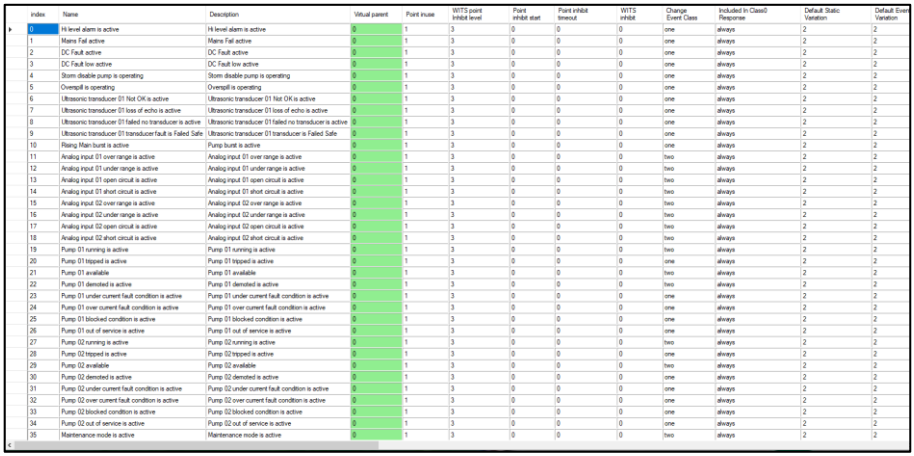
Open the rtuconfig.xml file that was exported from the Ultimate controller. Select **Configuration** > **Open** > **Open xml.**

For further details on how to export an xml file from an Ultimate please refer to Chapter 2 Ultimate Import/Export xml files.

You will then be prompted to open the xml file that was exported from Ultimate. When the software opens the xml, a configuration tree will appear on the left-hand side of the software to (as shown in the following screenshot.):

Binary Input Points

Selecting this menu from the tree will allow you to see part of the table of configurable binary input points, the columns shown can be changed by clicking on the tree view Binary input headers.



Index	Name	Description	Virtual parent	Point in use	WITS point inhibit level	Point inhibit start	Point inhibit timeout	WITS inhibit	Change Event Class	Included In Class0 Response	Default Static Variation	Default Event Variation
0	Hi level alarm is active	Hi level alarm is active	0	1	3	0	0	0	one	always	2	2
1	Mains Fail active	Mains Fail active	0	1	3	0	0	0	one	always	2	2
2	DC Fault active	DC Fault active	0	1	3	0	0	0	one	always	2	2
3	DC Fault low active	DC Fault low active	0	1	3	0	0	0	one	always	2	2
4	Storm disable pump is operating	Storm disable pump is operating	0	1	3	0	0	0	one	always	2	2
5	Overspill is operating	Overspill is operating	0	1	3	0	0	0	one	always	2	2
6	Ultrasonic transducer 01 Not OK is active	Ultrasonic transducer 01 Not OK is active	0	1	3	0	0	0	one	always	2	2
7	Ultrasonic transducer 01 loss of echo is active	Ultrasonic transducer 01 loss of echo is active	0	1	3	0	0	0	one	always	2	2
8	Ultrasonic transducer 01 failed no transducer is active	Ultrasonic transducer 01 failed no transducer is active	0	1	3	0	0	0	one	always	2	2
9	Ultrasonic transducer 01 transducer fault is Failed Safe	Ultrasonic transducer 01 transducer is Failed Safe	0	1	3	0	0	0	one	always	2	2
10	Rising Main burst is active	Pump burst is active	0	1	3	0	0	0	one	always	2	2
11	Analog input 01 over range is active	Analog input 01 over range is active	0	1	3	0	0	0	two	always	2	2
12	Analog input 01 under range is active	Analog input 01 under range is active	0	1	3	0	0	0	two	always	2	2
13	Analog input 01 open circuit is active	Analog input 01 open circuit is active	0	1	3	0	0	0	two	always	2	2
14	Analog input 01 short circuit is active	Analog input 01 short circuit is active	0	1	3	0	0	0	two	always	2	2
15	Analog input 02 over range is active	Analog input 02 over range is active	0	1	3	0	0	0	two	always	2	2
16	Analog input 02 under range is active	Analog input 02 under range is active	0	1	3	0	0	0	two	always	2	2
17	Analog input 02 open circuit is active	Analog input 02 open circuit is active	0	1	3	0	0	0	two	always	2	2
18	Analog input 02 short circuit is active	Analog input 02 short circuit is active	0	1	3	0	0	0	two	always	2	2
19	Pump 01 running is active	Pump 01 running is active	0	1	3	0	0	0	two	always	2	2
20	Pump 01 tripped is active	Pump 01 tripped is active	0	1	3	0	0	0	one	always	2	2
21	Pump 01 available	Pump 01 available	0	1	3	0	0	0	two	always	2	2
22	Pump 01 demoted is active	Pump 01 demoted is active	0	1	3	0	0	0	two	always	2	2
23	Pump 01 under current fault condition is active	Pump 01 under current fault condition is active	0	1	3	0	0	0	one	always	2	2
24	Pump 01 over current fault condition is active	Pump 01 over current fault condition is active	0	1	3	0	0	0	one	always	2	2
25	Pump 01 blocked condition is active	Pump 01 blocked condition is active	0	1	3	0	0	0	one	always	2	2
26	Pump 01 out of service is active	Pump 01 out of service is active	0	1	3	0	0	0	one	always	2	2
27	Pump 02 running is active	Pump 02 running is active	0	1	3	0	0	0	two	always	2	2
28	Pump 02 tripped is active	Pump 02 tripped is active	0	1	3	0	0	0	one	always	2	2
29	Pump 02 available	Pump 02 available	0	1	3	0	0	0	two	always	2	2
30	Pump 02 demoted is active	Pump 02 demoted is active	0	1	3	0	0	0	one	always	2	2
31	Pump 02 under current fault condition is active	Pump 02 under current fault condition is active	0	1	3	0	0	0	one	always	2	2
32	Pump 02 over current fault condition is active	Pump 02 over current fault condition is active	0	1	3	0	0	0	one	always	2	2
33	Pump 02 blocked condition is active	Pump 02 blocked condition is active	0	1	3	0	0	0	one	always	2	2
34	Pump 02 out of service is active	Pump 02 out of service is active	0	1	3	0	0	0	one	always	2	2
35	Maintenance mode is active	Maintenance mode is active	0	1	3	0	0	0	two	always	2	2

You can edit the individual or multiple columns by carrying out the following:

Highlight which columns that are to be selected, then click right on the column which will now bring up a menu:

- **Open point data** – This will open a form for that specific point.
- **Add Point** - This will add a point at the end of the list with an index of one more than the last index.
- **Copy** - Copy an existing point.
- **Cut** - Cut a row from the table.
- **Paste** - Paste a row into the table.
- **Delete** - Delete a row from the table.

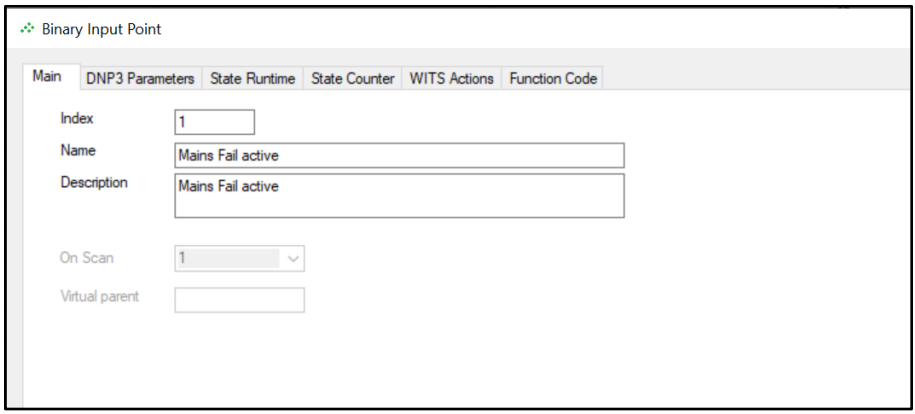
Important Information

Greyed out sections of the points functionality means that it is not used with DNP3 configurations.

Open Point Data

Double clicking on a specific point will open a form for that point and allow the user to make changes to it.

Binary Input Main Tab



Index

This is a unique number from 0 to 65535 for binary inputs.

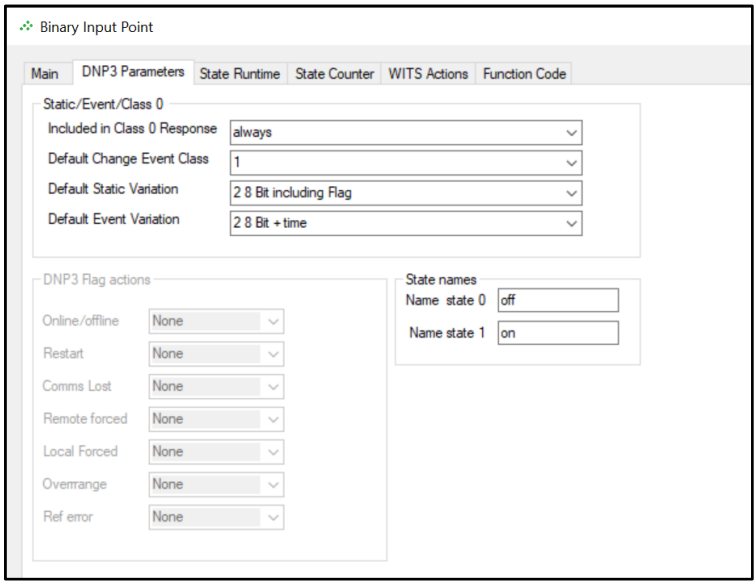
Name

This sets the name of the individual point on the table. This is not used in DNP3.

Description

This sets the description for the individual point on the table. This is not used in DNP3.

Binary Input DNP3 Parameters Tab



There is a command event class and command event variation. Where there is no value then they default to binary output static and event variations.

Included in Class 0 Response

This is normally set to always, so when the DNP3 master carries out an object 0 poll, all static data is returned. Other conditions can be selected; never or when assigned to class 1, 2, 3.

Default Change Event Class

The default to this is 1, but can be set to 1, 2, 3.

Default Static Variation

This is for the DNP3 master where the binary input value is either set to none, packed format 2 bytes, or 1-byte format.

Default Event Variation

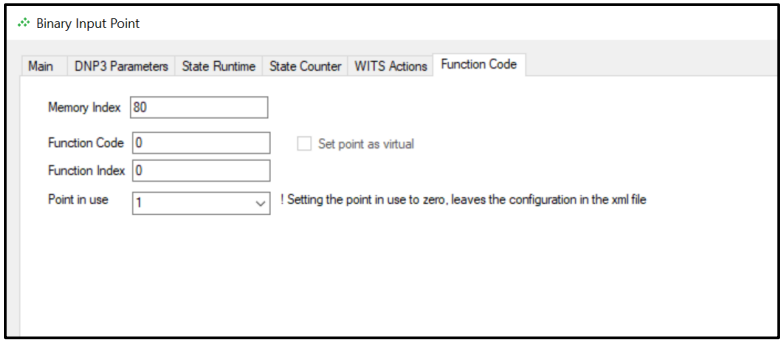
This is the event reporting for the binary input, and can be set to 8-bit, 8-bit+time or 8-bit+relative time. The default is set to 8-bit+time.

State Names

This is not transferred to DNP3 but is used as a reference.

State Run Time, State Counter and WITS actions are not used with DNP3 configurations.

Function Code Tab



Memory Index

This is a Pulsar feature, where the memory index is the shared memory between the Ultimate Controller and the RTU. In the example above it is set to 49, which is triggered by the high-level alarm. This memory is updated every 5 seconds. The list of memory indexes can be found in the Ultimate controller manual and also relate to registers used for Modbus communication.

Special Functions – Binary Input

Function code & Function Index

If a point is mapped out to the shared memory, then this is set to 0. To make a point a virtual point this must be set to 64.

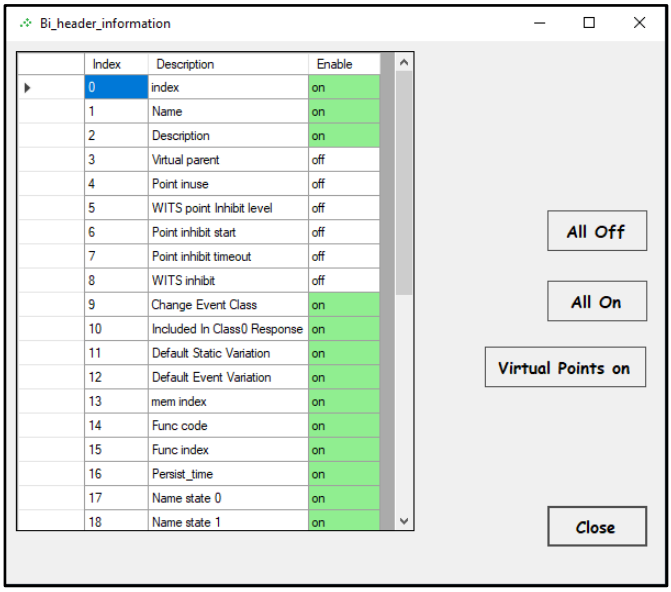
Function Code	Function index	Operation
0 (Default)	NA	Takes value of register
3	**2**	This tests for mA input open circuit, and tests this memory location, for 1 being open circuit. Typically this memory location would be the status of mA input (151, 161, 171.)
4	**2**	This tests for mA input short circuit, and tests this memory location, for 1 being open circuit. Typically this memory location would be 150 to 229
9	NA	This tests for dB Transducer status at the shared memory location, where Transducers start at IDX_TRANSDUCER_START 110
10	NA	This tests for Transducer for loss of echo at the shared memory location, where Transducers start at IDX_TRANSDUCER_START 110, this will set a flag if LOE
11	NA	This tests for Transducer for not connected at the shared memory location, where Transducers start at IDX_TRANSDUCER_START 110, this will set a flag if not connected.
12	NA	This tests for Transducer for FAIL at the shared memory location, where Transducers start at IDX_TRANSDUCER_START 110, this will set a flag if FAIL
14	NA	1= pump(s) running 0= no pumps running. Index not required
15	NA	1=pumps tripped, 0=pump(s) healthy Index not required. Index not required
16	NA	1=Pump(s) demoted 0=No Pumps Demoted. Index not required

Function Code	Function index	Operation
17	NA	1=Alarm relay(s) active 0=No alarm relay(s) active. No index required
18	NA	1=Control relay(s) active 0=No Control relay(s) active No index required
19	NA	1=dB Transducer(s) in fault condition 0=dB Transducer(s) healthy
20	NA	1=mA input(s) in fault condition 0=mA input(s) healthy

Point In Use

This is used where the user would want a point configured, but at the time the RTU parses the xmlconfig.xml file and this point would be ignored.

Binary Input Headers



Selecting this option will allow the user to adjust which variables are shown in the points in the Binary Input table.

All Off

This will disable all the variables shown in the points.

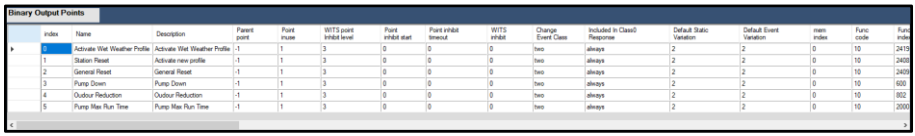
All On

This will enable all variables to be shown in the points.

Virtual Points

This will enable any virtual point variable to be shown in the points.

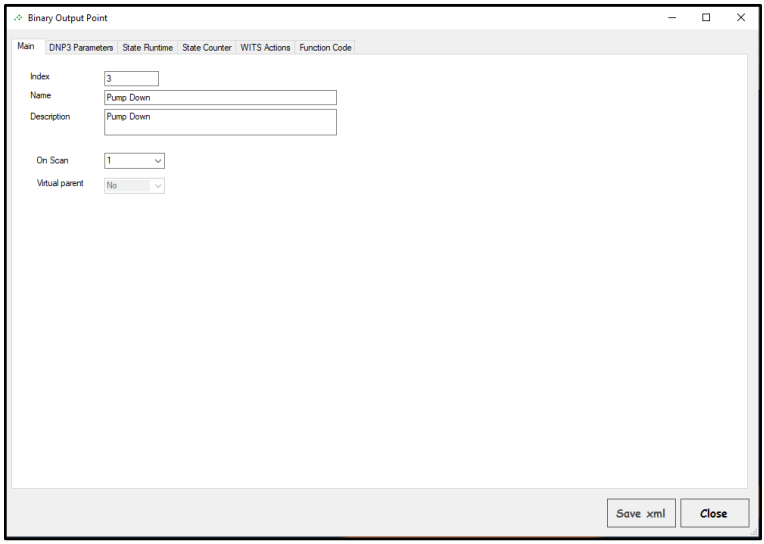
Binary Output Points



Double clicking on a specific point will open a form for that point and allow the user to make changes to it.

Open a single point from the binary output headers, in the below example point index 3 has been selected:

Binary Output Main Tab



Index

This is the DNP3 index.

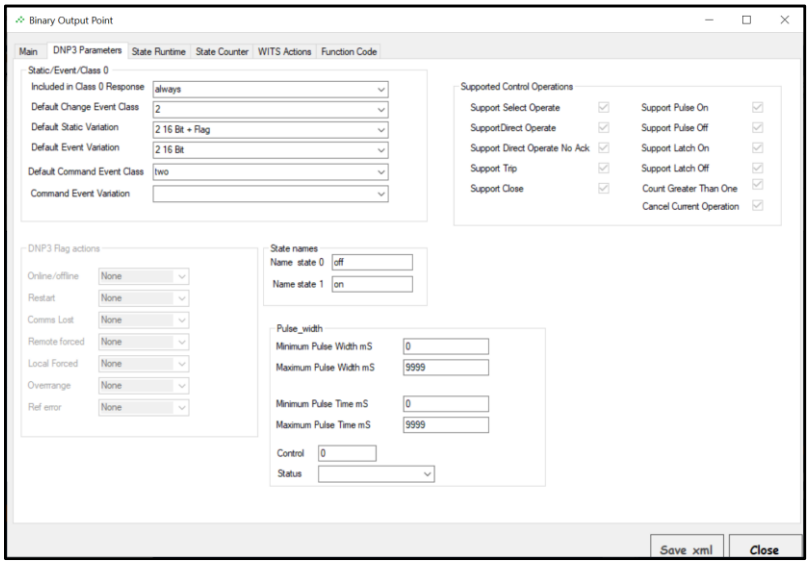
Name

This sets the name of the individual point on the table. This is not used in DNP3.

Description

This sets the description for the individual point on the table. This is not used in DNP3.

Binary Output DNP3 Parameters Tab



Included in Class 0 Response

This is normally set to always, so when the DNP3 master carries out an object 0 poll, all static data is returned. Other conditions can be selected; never or when assigned to class 1, 2, 3.

Default Change Event Class

The default to this is 1, but can be set to 1, 2, 3.

Default Static Variation

This is for the DNP3 master where the binary input value is either set to none, packed format 2 bytes, or 1-byte format.

Default Event Variation

This is the event reporting for the binary input, and can be set to 16-bit, 16-bit+time or 16-bit+relative time. The default is set to 16-bit+time.

Default Command event class

This is

Command Event Variation

This is

State Names

This is not transferred to DNP3 but is used as a reference.

Pulse Width

This is a legacy feature for the electricity industry for controlling moving actuators and control valves.

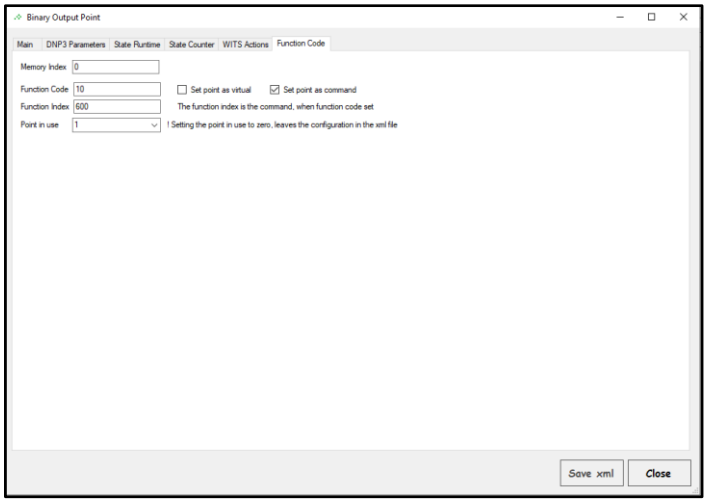
Supported Control Operations

This is also a legacy feature, the Ultimate Controller will use the 'Direct Operate No Ack' and 'Direct Operate'. Pulsar supports all modes as part of the TMW stack.

Important Information

State Run Time, State Counter and WITS actions are not used with DNP3 configurations.

Binary Output Function Code Tab



The functionality of this tab is similar to the binary input. However, the difference is that the function code is set to 10, and the function index is 600, which comes from the excel spreadsheet of Ultimate Controller remote commands (this is Run on enabled).

If any of the points functionality has been changed, selecting Save xml will save the changes made and create an xml file with the changes made in it. Or selecting close will shut the point configuration box down and allow you to make further changes before saving all changes to an xml file.

Important Information

State Run Time, State Counter and WITS actions are not used with DNP3 configurations.

Special Functions – Binary Output

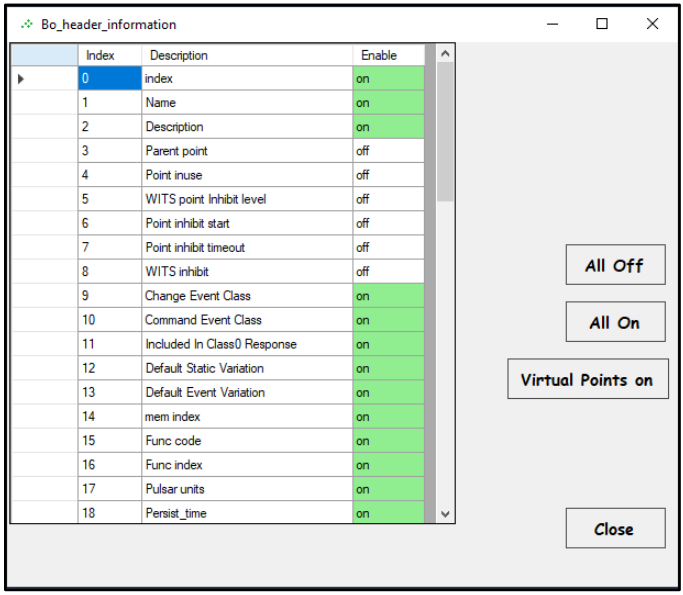
Important Information

For forcing relay outputs in Ultimate controller please use Analogue output functions.

Function code & Function Index

Function Code	Function Index	Description
1	10	Remotely Set a Pump Relay on/off (3=on, 4= off) Name of point relates to order of pump (01, 02, 03…. Required in point name)
2	8	Remotely Set a Pump Relay on/off (3=on, 4= off) Name of point relates to order of pump (01, 02, 03…. Required in point name)
3	9	Remotely Set an Alarm Relay on/off (3=on, 4= off) Name of point relates to order of pump (01, 02, 03…. Required in point name)
4		Remotely Set a Control Relay on/off (3=on, 4= off) Name of point relates to order of pump (01, 02, 03…. Required in point name)

Binary Output Headers



Selecting this option will allow the user to adjust which variables are shown in the points in the Binary Output table.

All Off

This will disable all the variables shown in the points.

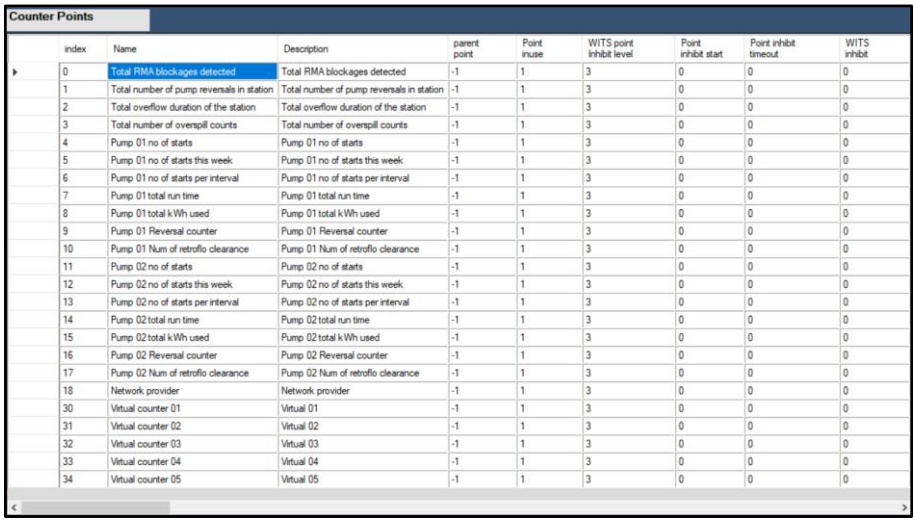
All On

This will enable all variables to be shown in the points.

Virtual Points

This will enable any virtual point variable to be shown in the points.

Counter Points Tab

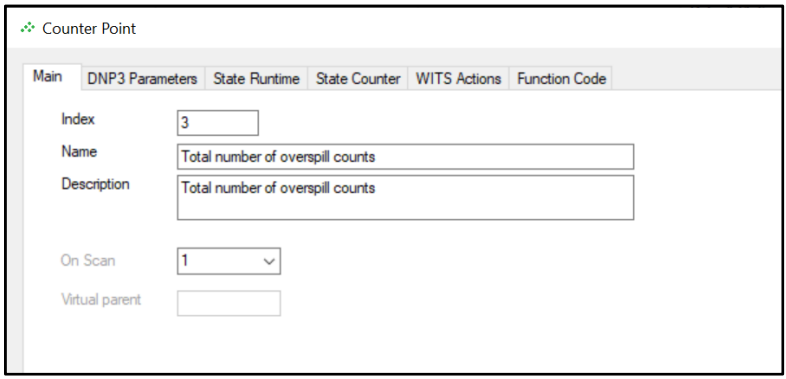


Counter Points

index	Name	Description	parent point	Point inuse	WITS point Inhibit level	Point inhibit start	Point inhibit timeout	WITS inhibit
0	Total RMA blockages detected	Total RMA blockages detected	-1	1	3	0	0	0
1	Total number of pump reversals in station	Total number of pump reversals in station	-1	1	3	0	0	0
2	Total overflow duration of the station	Total overflow duration of the station	-1	1	3	0	0	0
3	Total number of overspill counts	Total number of overspill counts	-1	1	3	0	0	0
4	Pump 01 no of starts	Pump 01 no of starts	-1	1	3	0	0	0
5	Pump 01 no of starts this week	Pump 01 no of starts this week	-1	1	3	0	0	0
6	Pump 01 no of starts per interval	Pump 01 no of starts per interval	-1	1	3	0	0	0
7	Pump 01 total run time	Pump 01 total run time	-1	1	3	0	0	0
8	Pump 01 total kWh used	Pump 01 total kWh used	-1	1	3	0	0	0
9	Pump 01 Reversal counter	Pump 01 Reversal counter	-1	1	3	0	0	0
10	Pump 01 Num of retroflo clearance	Pump 01 Num of retroflo clearance	-1	1	3	0	0	0
11	Pump 02 no of starts	Pump 02 no of starts	-1	1	3	0	0	0
12	Pump 02 no of starts this week	Pump 02 no of starts this week	-1	1	3	0	0	0
13	Pump 02 no of starts per interval	Pump 02 no of starts per interval	-1	1	3	0	0	0
14	Pump 02 total run time	Pump 02 total run time	-1	1	3	0	0	0
15	Pump 02 total kWh used	Pump 02 total kWh used	-1	1	3	0	0	0
16	Pump 02 Reversal counter	Pump 02 Reversal counter	-1	1	3	0	0	0
17	Pump 02 Num of retroflo clearance	Pump 02 Num of retroflo clearance	-1	1	3	0	0	0
18	Network provider	Network provider	-1	1	3	0	0	0
30	Virtual counter 01	Virtual 01	-1	1	3	0	0	0
31	Virtual counter 02	Virtual 02	-1	1	3	0	0	0
32	Virtual counter 03	Virtual 03	-1	1	3	0	0	0
33	Virtual counter 04	Virtual 04	-1	1	3	0	0	0
34	Virtual counter 05	Virtual 05	-1	1	3	0	0	0

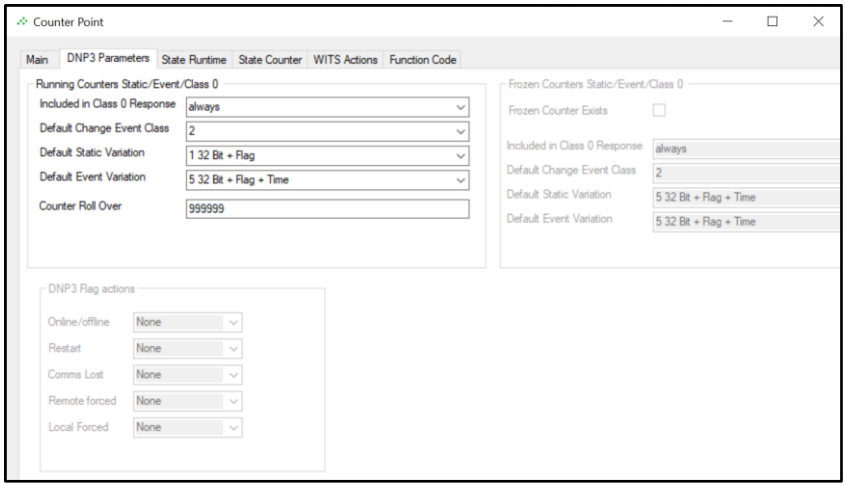
The Counters tab displays the number of times that a point has been activated. Double clicking on the individual points will open a form to allow changes to be made. Some of the information that is seen and is changeable in the form is repeated from the Binary Input information. For further information on each of the tab's functionality please refer to the Binary Inputs Open data points section of this manual.

Counter Point Main Tab



The functionality of this tab has been covered in the Binary inputs section of this manual.

Counter DNP3 Parameters Tab

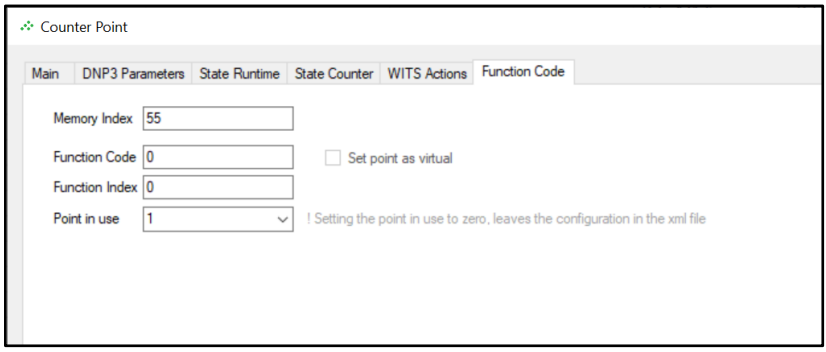


The functionality of this tab has been covered in the Binary inputs section of this manual.

Important Information

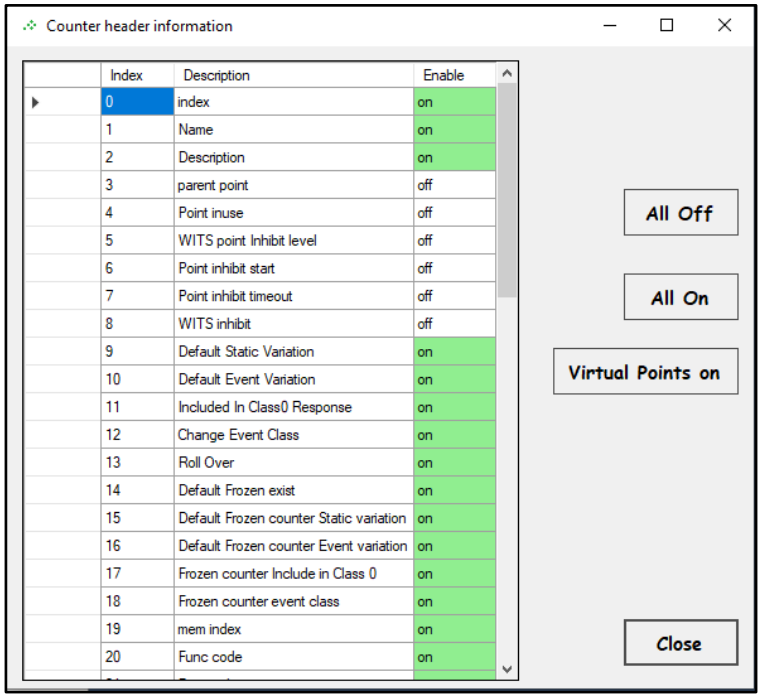
State Run Time, State Counter and WITS actions are not used with DNP3 configurations.

Counter Point Function Code Tab



The functionality of this tab has been covered in the Binary inputs section of this manual.

Counter Point Headers



Selecting this option will allow the user to adjust which variables are shown in the points in the Counter Point table.

All Off

This will disable all the variables shown in the points.

All On

This will enable all variables to be shown in the points.

Virtual Points

This will enable any virtual point variable to be shown in the points.

Analogue Input Points

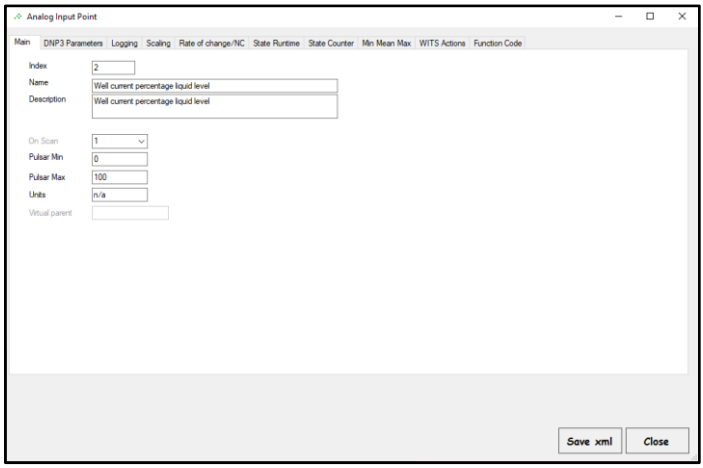
Analog input Points

	index	Name	Description	Parent point	Point inuse	WITS point Inhibit level	Point inhibit start	Point inhibit timeout	Change Event Class
▸	0	inflow rate	inflow rate	-1	1	3	0	0	three
	1	Well current liquid level	Well current liquid level	-1	1	3	0	0	three
	2	Well current percentage liquid level	Well current percentage liquid level	-1	1	3	0	0	three
	3	Well current volume of liquid	Well current volume of liquid	-1	1	3	0	0	three
	4	mA input 01 value	mA input 01 value	-1	1	3	0	0	three
	5	mA input 02 value	mA input 02 value	-1	1	3	0	0	three
	6	Pump 01 rate	Pump 01 rate	-1	1	3	0	0	three
	7	Pump 01 phase A current	Pump 01 phase A current	-1	1	3	0	0	three
	8	Pump 01 phase B current	Pump 01 phase B current	-1	1	3	0	0	three
	9	Pump 01 phase C current	Pump 01 phase C current	-1	1	3	0	0	three
	10	Pump 01 IRT resistance	Pump 01 IRT resistance	-1	1	3	0	0	three
	11	Pump 01 efficiency	Pump 01 efficiency	-1	1	3	0	0	three
	12	Pump 01 kWh/m3	Pump 01 kWh/m3	-1	1	3	0	0	three
	13	Pump 02 rate	Pump 02 rate	-1	1	3	0	0	three
	14	Pump 02 phase A current	Pump 02 phase A current	-1	1	3	0	0	three
	15	Pump 02 phase B current	Pump 02 phase B current	-1	1	3	0	0	three
	16	Pump 02 phase C current	Pump 02 phase C current	-1	1	3	0	0	three
	17	Pump 02 IRT resistance	Pump 02 IRT resistance	-1	1	3	0	0	three
	18	Pump 02 efficiency	Pump 02 efficiency	-1	1	3	0	0	three
	19	Pump 02 kWh/m3	Pump 02 kWh/m3	-1	1	3	0	0	three
	20	xdr 01 confidence	xdr 01 confidence	-1	1	3	0	0	three
	21	Network strength	Network Signal strength	-1	1	3	0	0	three
	22	Average Fill Time	Average Fill Time This Week	-1	1	3	0	0	three
	23	Average Empty Time	Average Empty Time This Week	-1	1	3	0	0	three
	30	Virtual analog input 01	Virtual analog input 01	-1	1	3	0	0	two
	31	Virtual analog input 02	Virtual analog input 02	-1	1	3	0	0	two

Selecting this menu from the tree will allow you to see part of the table of configurable analogue input points, the columns shown can be changed by clicking on the tree view Analogue input headers.

The options available when clicking on a point in the table are identical to those for the binary input table. For further information on each the tabs functionality please refer to the Binary Inputs Open data points section of this manual.

Analogue Input Main Tab



The functionality for Index, Name, Description and On Scan have been explained previously in the manual. For further information on their functionality please refer to the Binary Inputs Open data points section of this manual.

Pulsar Min

This is the lower limit of the value from the Ultimate Controller.

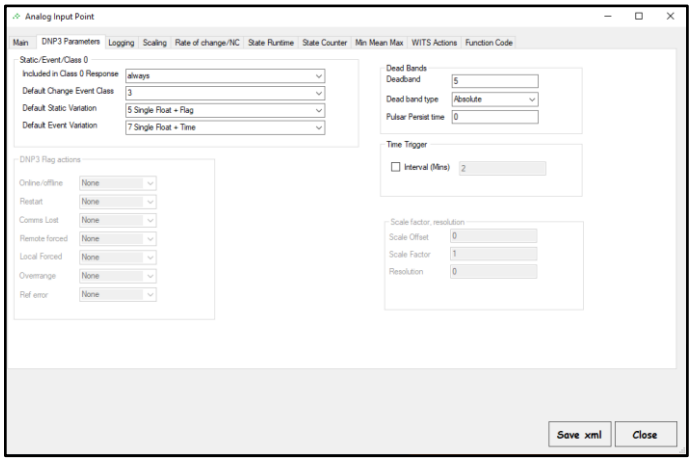
Pulsar Max

This is the high limit of the value from the Ultimate Controller.

Units

This is a Pulsar unis description and is used for information purposes only.

Analogue Input DNP3 Parameters Tab



The functionality for the group boxes Static/Event/Class 0 and DNP3 Flags have been explained previously in the manual. For further information on their functionality please refer to the Binary Inputs Open data points section of this manual.

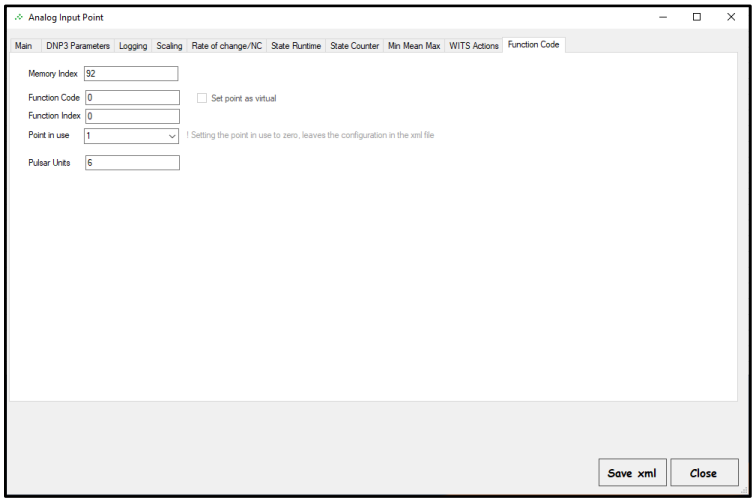
Dead band

The dead band is in mm, and now only Absolute is supported. With the dead band value shown if the current analogue level was 120mm and increased to 140mm this would create a DNP3 event. And the last value of 140mm would be stored internally, however if the level read was 149mm or 131mm then no event on this point would occur. However, if the level increased to 153mm, then a DNP3 event would be triggered and the last value of 153mm would be stored internally.

Important Information

Logging, Scaling, Rate of Change / NC, State Run Time, State Counter, Min, Mean, Max, and WITS actions are not used with DNP3 configurations.

Analogue Input Function Code Tab



The functionality of this tab has been covered in the Binary inputs section of this manual.

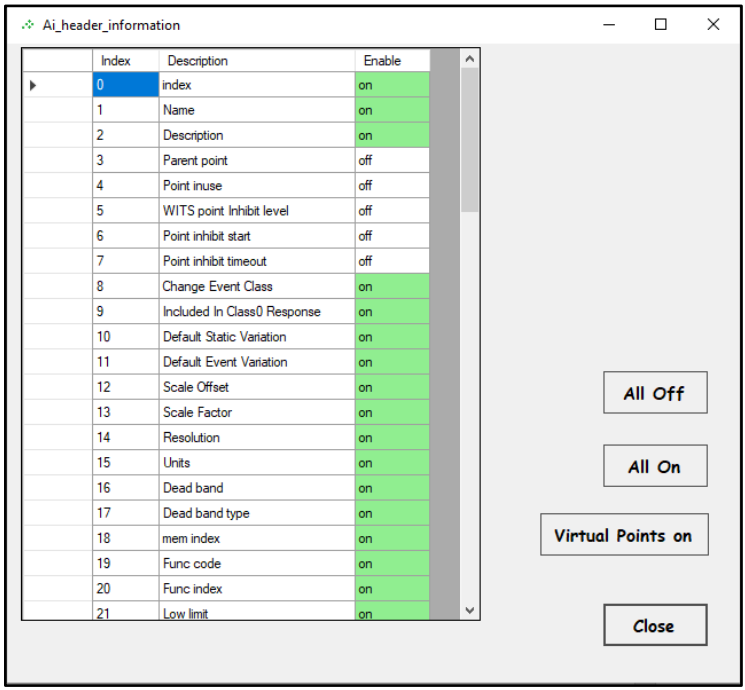
Special Functions – Analogue Inputs

Function code & Function Index

Function Code	Function Index	Description
8	(index of required variable) - (relay status index of pump) e.g. Pump1 phase A current = 384, Pump1 relay status=350. 384-350=34	Phase Voltage/current/power factor for running pump

If any of the points functionality has been changed, selecting Save xml will save the changes made and create an xml file with the changes made in it. Or selecting close will shut the point configuration box down and allow you to make further changes before saving all changes to an xml file.

Analogue Input Headers



Selecting this option will allow the user to adjust which variables are shown in the points in the Analogue Input table.

All Off

This will disable all the variables shown in the points.

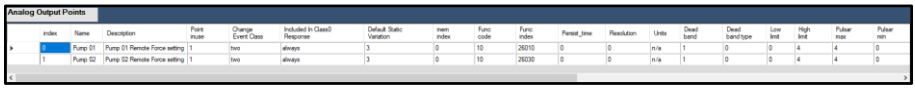
All On

This will enable all variables to be shown in the points.

Virtual Points

This will enable any virtual point variable to be shown in the points.

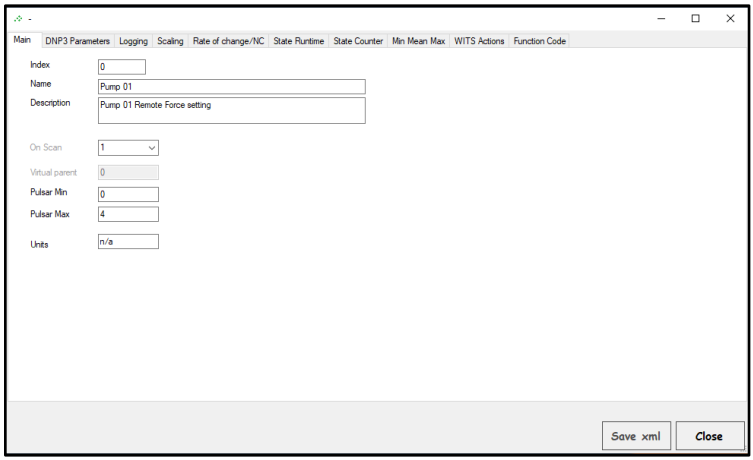
Analogue Output Points



Selecting this menu from the tree will allow you to see part of the table of configurable analogue output points, the columns shown can be changed by clicking on the tree view Analogue output headers.

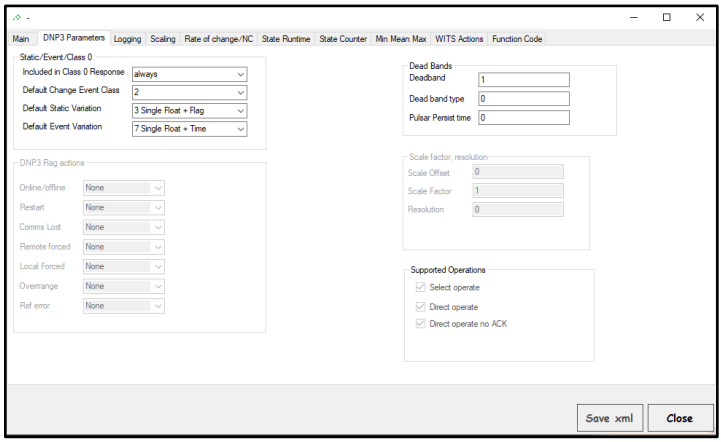
The options available when clicking on a point in the table are identical to those for the binary input table. For further information on each the tabs functionality please refer to the Binary Inputs Open data points section of this manual.

Analogue Output Main Tab



The functionality of this tab has been covered in the Binary inputs section of this manual.

Analogue Output DNP3 Parameters Tab

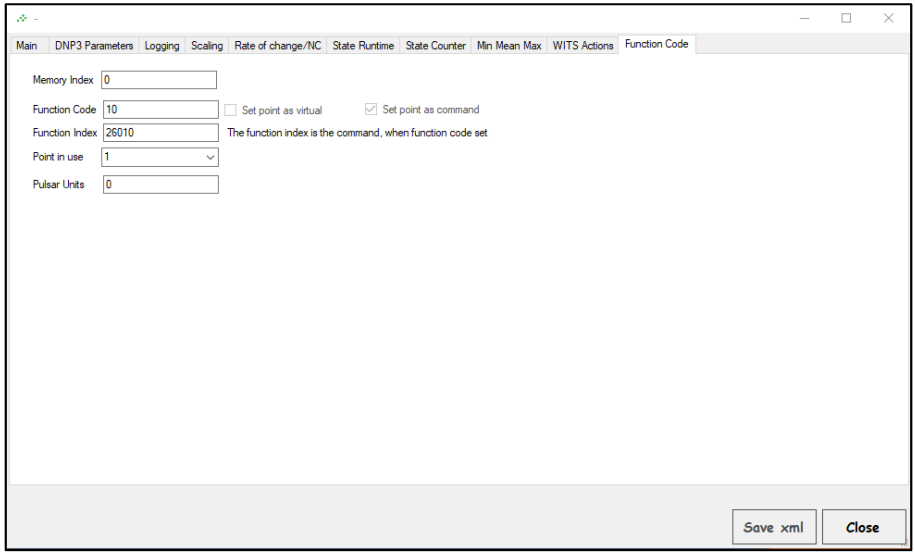


The functionality of this tab has been covered in the Binary inputs section of this manual. The only difference with the functionality of this form is that the default values for the Static and Event variation are different.

Important Information

Logging, Scaling, Rate of Change / NC, State Run Time, State Counter, Min, Mean, Max, and WITS actions are not used with DNP3 configurations.

Analogue Output Function Code Tab



The functionality of this tab has been covered in the Binary inputs section of this manual.

Special Functions – Analogue output

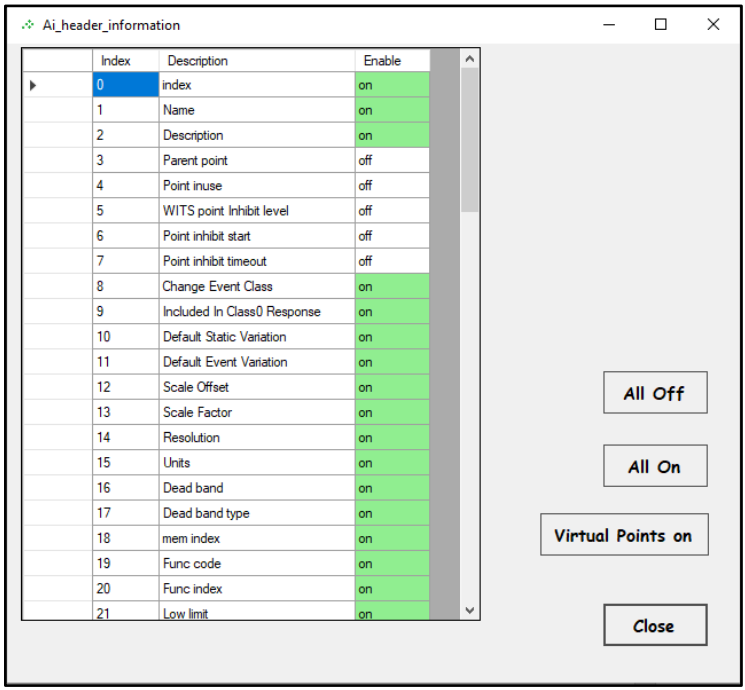
Function code & Function Index

Function code	Function index	Description
1	0=Allocated measurement point 1=Setpoint1 2=Setpoint2 3=Setpoint3 4=Setpoint4 5=Closures 6=Failsafe 7=Max Rate 8=Standby 9=eventSMS 10=Remote forced setting	Allows writing of values to **Pump** relays. Memory index is not used. Relay selection relies on Point name containing 01, 02, 03… related to pump relay position in the relay setup table (not related to physical relay number).
2	0=Allocated measurement point 1=Setpoint1 2=Setpoint2 3=Setpoint3 4=Setpoint4 5=Closures 6=Failsafe 7=eventSMS 8=event sound 9=Remote forced setting	Allows writing of values to **Alarm** relays. Memory index is not used. Relay selection relies on Point name containing 01, 02, 03 related to alarm relay position in relay setup table (not related to physical relay number).
3	0=Allocated measurement point 1=Setpoint1 2=Setpoint2 3=Setpoint3 4=Setpoint4 5=Closures 6=Failsafe 7=eventSMS 8=Remote forced setting	Allows writing of values to **Control** relays. Memory index is not used. Relay selection relies on Point name containing 01, 02, 03 related to control relay position in relay setup table (not related to physical relay number).

Function code	Function index	Description
4	0=Allocated measurement point 1=Setpoint1 2=Setpoint2 3=Setpoint3 4=Setpoint4 5=Closures 6=Failsafe 7=eventSMS 8=Remote forced setting	Allows writing of values to **Miscellaneous** relays. Memory index is not used. Relay selection relies on Point name containing 01, 02, 03 related to miscellaneous relay position in relay setup table (not related to physical relay number).
8	DNP3 index of Analogue input you want to set	This function allows a analogue input low limit scale to be set remotely, Memory index not used
9	DNP3 index of Analogue input you want to set	This function allows a analogue input low limit scale to be set remotely, Memory index not used
10	Memory location index	General command to write to a memory location. Memory index not used.

If any of the points functionality has been changed, selecting Save xml will save the changes made and create an xml file with the changes made in it. Or selecting close will shut the point configuration box down and allow you to make further changes before saving all changes to an xml file.

Analogue Output Headers



Selecting this option will allow the user to adjust which variables are shown in the points in the Analogue Output table.

All Off

This will disable all the variables shown in the points.

All On

This will enable all variables to be shown in the points.

Virtual Points

This will enable any virtual point variable to be shown in the points.

Configuration

This allows you to configure the connection details to the Ultimate Controller. There are options in each of the forms to default, save xml or close the current configuration.

Default

Selecting this will default all options values to their normally configured values.

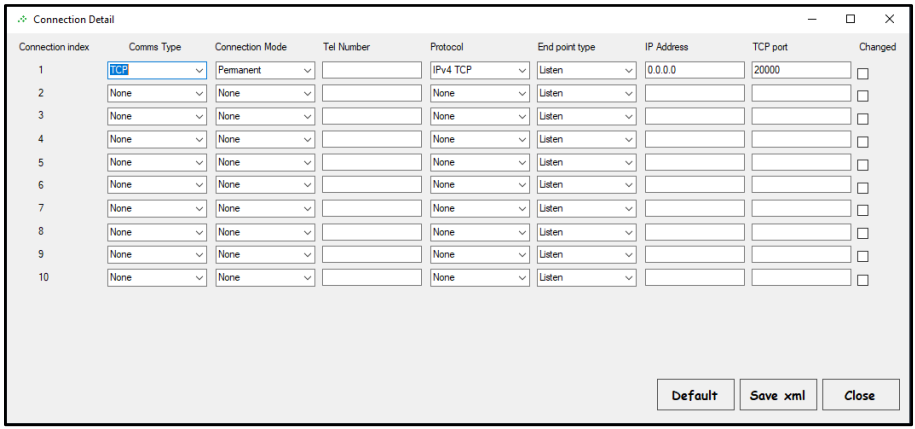
Save Xml

Selecting this will save the current configuration back to its original file name, or a new file name. Which can then be imported back into the RTU via the Ultimate UI.

Close

Selecting this will close the current configuration until saved or defaulted.

Connection Details

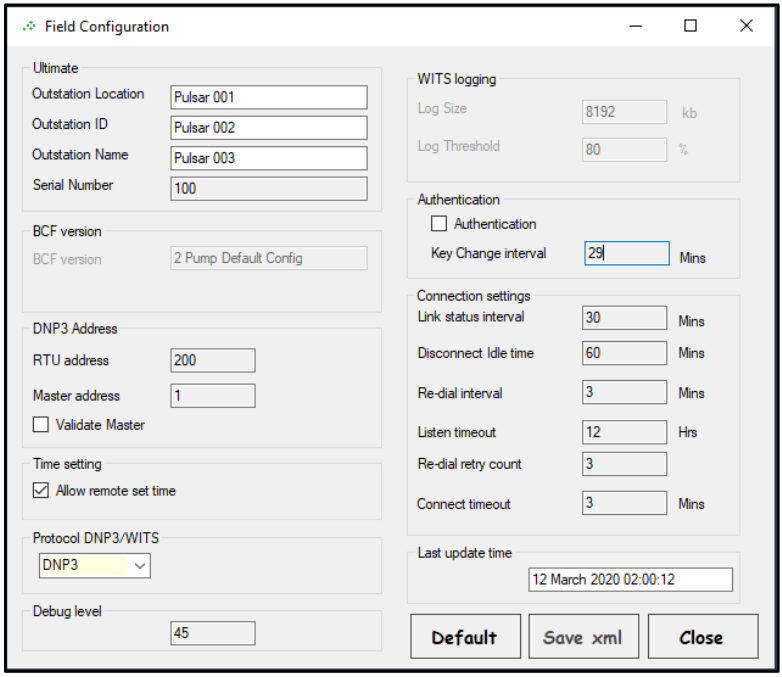


In the example shown above, in the first connection the RTU is configured as a "Listener". I.e. It is running in a server permanent mode listening on port 20000 for IPv4 TCP traffic, the address 0.0.0.0 denotes it is listening from any source.

The second connection, is an on-demand connection to a server on IP address 192.168.0.155 listening on port 20000 for IPV4 traffic. For example, any events created by the RTU will be sent to the DNP3 master.

Note: When configuring/Testing the RTU for comms, make sure any firewalls are set to allow port 20000 through, the DNP3 source and destination address are set correctly. The DNP3 have enabled unsolicited events, and check whether authentication is switch on or not.

Field Configuration



This is the most important form to configure so that communication between the Ultimate Controller and the master can take place correctly.

Ultimate

The options ***Outstation Location***, ***ID*** and ***Name*** identify the Ultimate Controllers location. ***Serial Number*** helps to identify the Ultimate Controller itself, and if any queries arise regarding the Ultimate Pulsar engineers may require this information.

BCF

This is not used with the DNP3 configuration.

DNP3 Address

RTU Address

This is the source address from where the information is to be sent from (Ultimate Controller).

Master Address

This is the address for the Master DNP3 where the information is to be sent to.

Validate Master

When ticked, the RTU will only respond to a master with the same address as set in the Master address.

Time Setting

Allow Remote Set Time

We advise that this be set (ticked), as this allows the Ultimate time (UTC) to be kept in sync with the master.

Protocol DNP3/WITS

This drop-down box will be set to DNP3 by default.

Debug Level

This sets what is printed to the file DNP3_DMS.temp file which is stored in the ram disk. At 23:59 the file is renamed to DNP3_DMS.log, where at which point the program will move the logfile to the external SD card.

WITS Logging

This is not used with the DNP3 configuration.

Authentication

Authentication

The tick box is used to enable or disable this feature. We recommended to start off with authentication switched off at the RTU and the master, to prove communications is stable, see section on form Security Configuration for more details on authentication.

Key Change Interval

This is system dependent, it is recommended that the value entered here is less than the link status interval as DNP3 traffic consideration comes into this setting.

Connection Settings

Link Status Interval

The RTU sends out a DNP3 null link status poll which allows the RTU to "know" that it is still connected on a TCP connection. For example, the RTU will issue this DNP3 link poll every 30 mins, if there is no DNP3 traffic that is received in this 30-minute period, then the RTU will close the connection and revert to connection 1 setup. Therefore, setting key change interval to less than this interval.

Disconnect Idle Time

This timer will close any current connection if there is no DNP3 data received in this period (in minutes).

Re-Dial Interval

This is the time between successive connections to obtain a connection. For example, if the RTU is attempting to connect to a failed service you would want to limit the time intervals between re-tries.

Listen Timeout

This is a back-stop system, whereby if no DNP3 communications have been received for 'x' period of time (in hours) shown here, then the RTU will reboot. This is to cater for any internal modem/RTU lockups, it is not expected to happen, but used as a backup system.

Re-Dial Retry Count

This is the count given for a single or multiple outgoing connections. So, if an outgoing connection fails after the amount of tries set here then the next connection is used.

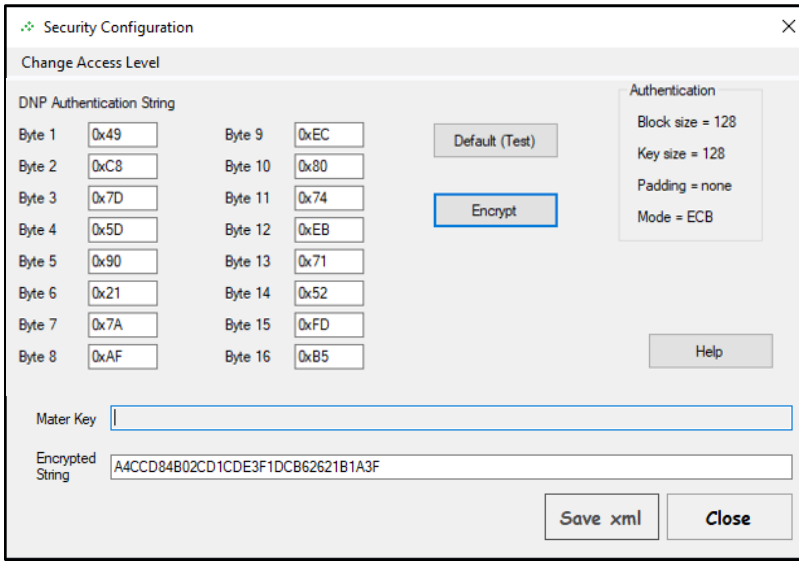
Connect Timeout

When attempting to establish a connection, modems such as PTSN modems can take a reasonable amount of time to establish a connection. If the connection is not established by the time (in minutes) set here, then a re-try is attempted after the re-dial interval.

Last Update Time

This update time variable is written to the rtuconfig.xml file, at the time of writing, whether it is from the DNP3Configurator or from the Ultimate Controller.

Security Configuration

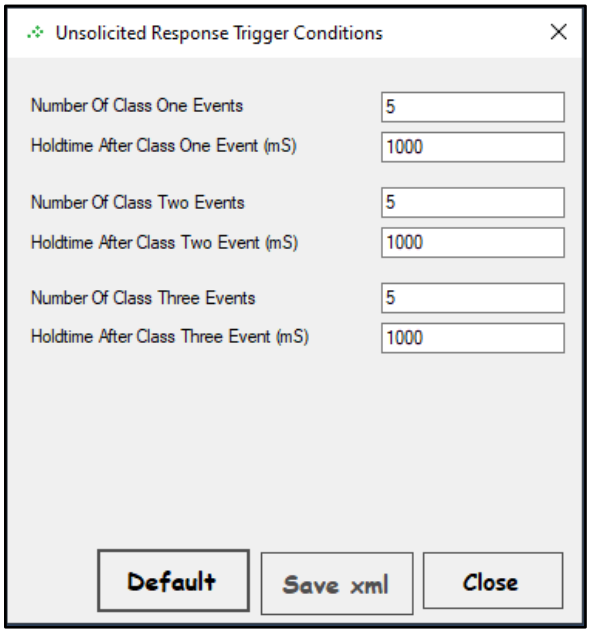


The authentication key for the master is set by populating the text boxes Byte 1 to Byte 16, for initial testing you can default the key, this will populate the Master Key box, to make it easier to copy and paste to a master.

Press the 'Encrypt' button, which will encrypt the key (AES) and can then be saved to the rtuconfig.xml file or make a note of the encrypted string so that it can be entered manually via the Ultimate UI.

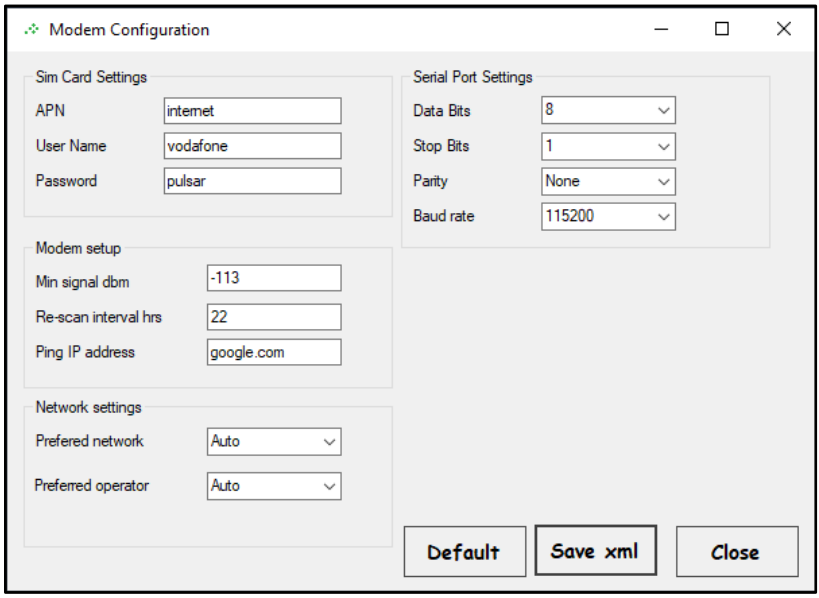
The key is encrypted so it can be given to third parties to manually set up a configuration on the Ultimate or saved in the xml file without revealing the real key.

Unsolicited Response Trigger Conditions



For each class 1,2 or 3, conditions can be defined which cause the RTU to transmit unsolicited events. For example, Class one events will not be sent unless either we have 5 class one events or 1 second has elapsed from the triggering of the first event. This is used to reduce the amount of DNP3 traffic sent to the master.

Modem Configuration



Sim Card Settings

APN

This is used to set the SIM card APN, which is typically internet or mobiusnetworks.net.

Username

This is the SIM network login name, some providers although they don't require a login username it is expected that this field is populated.

Password

This is a password that is set to access the network. This must also be populated, and the password remembered.

Modem Setup

Min Signal dbm

This is the minimum threshold for the modem to consider the signal level to be acceptable, -113 is the bottom limit.

Re-scan Interval

This is the amount of time (in hours) that the modem will disconnect, and if the auto re-scan and re-connect to the network.

Re-scan Interval

This is the amount of time (in hours) that the modem will disconnect, and if auto re-scan and re-connect to the network.

Network Settings

Preferred Network

Use this to set the modem to use either 2G only, 2G preferred, 3G only or 3G preferred.

Preferred Operator

Use this to connect the modem to a preferred operator from the drop-down menu selection options, such as Vodafone.

Serial Port Settings

Preferred Network

When using an internal modem set to a default of the following: 8 data bit, 1 stop bit, no parity, and baud rate of 115200. Otherwise, if using serial comms then these can set as desired.

CHAPTER 4 SITE INSTALLATION AND TESTING

TCP Communications

if the RTU is going to be in listening mode then set the IP address as 0.0.0.0, and the connecting mode as permanent.

If the connection is an on-demand type, set the first connection as above, and add a second connection mode as on-demand. Then set the IP address to the master's address. Also set the TCP port number for both cases above, which would typically be 20000.

GPRS Modem Communications

Firstly, set the APN, network username and password. The username may not be required, however it is strongly advised to set a username and password.

Set the mode of communication, it is recommended to use the first connection as a listener, always. And if necessary, set the second connection as outgoing. However, since this is a TCP connection it should not be an on-demand connection.

Set a link status interval to 30 mins, this is a DNP3 null poll, and it tests the connection from the RTU to the master.
Set the disconnect idle time, to be a value greater than the link status interval, for example 120 mins.

Listen time out, is a fallback. So, if the RTU receives no DNP3 comms for 12hrs (user configurable) then the RTU will re-boot and will rely on the RTU to restart.

Testing

Establish comms with the DNP3 master, the output from the RTU can be monitored using a RS232 lead connected to the debug port.
You will see the DNP3 master and now disable unsolicited messages, and Poll all static points.
Remove events from the RTU event buffer and obtain all the log files from RTU, where the RTU will clear log entries on removal.
Now look to synchronize the RTU clock to UTC time and re-enable all unsolicited messages.

Test that all points create an event (Binary inputs, Counters, Analogue inputs), if the analogue control is enabled check these control points operate correctly.
And finally check that the Ultimate clock is set correct.

CHAPTER 5 DISPOSAL

Incorrect disposal can cause adverse effects to the environment.

Dispose of the device components and packaging material in accordance with regional environmental regulations including regulations for electrical \ electronic products.

Transducers

Remove power, disconnect the Transducer, cut off the electrical cable and dispose of cable and Transducer in accordance with regional environmental regulations for electrical \ electronic products.

Controllers

Remove power, disconnect the Controller, and remove battery (if fitted). Dispose of Controller in accordance with regional environmental regulations for electrical \ electronic products.

Dispose of batteries in accordance with regional environmental regulations for batteries.

EU WEEE Directive Logo

This symbol indicates the requirements of Directive 2012/19/EU regarding the treatment and disposal of waste from electric and electronic equipment.

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