



DNP3 Field Device Profile

for

Document Name: Woodward DNP3 XML File

Revision History

Date	Time	Version	Reason for change	Edited by
2012-01-11		1	Initial Version	Joerg Katzer
2015-04-16	15:00:00	2	First updates	Joerg Katzer Claus Kronenberger
2017-09-22	11:00:00	3	Review of current implementation	Joerg Katzer Claus Kronenberger Krzysztof Urgacz

REFERENCE DEVICE

1. Device Properties

Unless otherwise noted, multiple boxes in the second column below are selected for each parameter to indicate all capabilities supported or required. Parameters without checkboxes in the second column do not have capabilities and are included so that the current value may be shown in the third column.

The items listed in the capabilities column below may be configurable to any of the options selected, or set to a fixed value when the device was designed. Item 1.1.10 contains a list of abbreviations for the possible ways in which the configurable parameters may be set. Since some parameters may not be accessible by each of these methods supported, an abbreviation for the configuration method supported by each parameter is shown in the fourth column of the tables below.

This document may be used to show the device capabilities, the current value of each parameter, or both. If it is used to show the current values, column 3 is filled in even if a fixed parameter is selected in the capabilities section.

If the document is used to show the current values of parameters, then column 3 applies to a single connection between a master and an outstation.

1.1. DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable list methods
<p>1.1.1. Device Function:</p> <p><i>Masters send DNP requests, while Outstations send DNP responses. If a single physical device can perform both functions a separate Device Profile Document must be provided for each function.</i></p>	- Outstation	- Outstation	.
<p>1.1.2. Vendor Name:</p> <p><i>The name of the organization producing the device.</i></p>	-	Woodward	-
<p>1.1.3. Device Name:</p> <p><i>The model and name of the device, sufficient to distinguish it from any other device from the same organization.</i></p>	-	HighPROTEC	-
<p>1.1.4. Device manufacturer's hardware version string:</p>	-		-
<p>1.1.5. Device manufacturer's software version string:</p>	-	see corresponding device manual page 1 or on panel at device Para - Version	-
<p>1.1.6. Device Profile Document Version Number:</p> <p><i>Version of the Device Profile Document is indicated by a whole number incremented with each new release. This should match the latest version shown in the Revision History at</i></p>	-	1.3	-

<i>the start of this document.</i>			
<p>1.1.7. DNP Levels Supported for:</p> <p><i>Indicate each DNP3 Level to which the device conforms fully. For Nasters, requests and responses can be indicated independently.</i></p>	<p>Outstations Only Requests and Responses</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> None <input checked="" type="checkbox"/> Level 1 <input checked="" type="checkbox"/> Level 2 <input type="checkbox"/> Level 3 	Level 2	
1.1.8. Supported Function Blocks:	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Self Address Reservation <input type="checkbox"/> Object 0 - attribute objects <input type="checkbox"/> Data Sets <input type="checkbox"/> File Transfer <input type="checkbox"/> Virtual Terminal <input type="checkbox"/> Mapping to IEC 61850 Object Models defined in a DNP3 XML file 	Self Address	
<p>1.1.9. Notable Additions:</p> <p><i>A brief description intended to quickly identify for the reader the most obvious features the device supports in addition to the Highest DNP Level Supported. The complete list of features is described in the Implementation Table.</i></p>	This is a notable addition	This is a notable addition	
1.1.10. Methods to set Configurable Parameters:	<ul style="list-style-type: none"> <input type="checkbox"/> XML - Loaded via DNP3 File Transfer <input type="checkbox"/> XML - Loaded via other transport mechanism <input type="checkbox"/> Terminal - ASCII Terminal Command Line <input checked="" type="checkbox"/> Software - Vendor software named Smart view <input type="checkbox"/> Proprietary file loaded via DNP3 File Transfer <input type="checkbox"/> Proprietary file loaded via other transport mechanism <input checked="" type="checkbox"/> Direct - Keypad on device front panel <input type="checkbox"/> Factory - Specified when device is ordered <input type="checkbox"/> Protocol - Set via DNP3 (e.g. assign class) <input type="checkbox"/> Other - explain: 	Software Direct	
	<u>RdWrFilename</u>	<u>Description of Contents</u>	<u>Rd Wr Filename</u>

<p>1.1.11. DNP3 XML files available On-line:</p> <p><i>XML configuration file names that can be read or written through DNP3 File Transfer to a device.</i></p> <p><i>A device's currently running configuration is returned by DNP3 on-line XML file read from the device.</i></p> <p><i>DNP3 on-line XML file write to a device will update the device's configuration when the Activate Configuration (function code 31) is received.</i></p>	<table border="0"> <tr> <td><input type="checkbox"/></td> <td>dnpDP.xml</td> <td>Complete Device Profile Device</td> </tr> <tr> <td><input type="checkbox"/></td> <td>dnpDPCap.xml</td> <td>Profile Capabilities Device</td> </tr> <tr> <td><input type="checkbox"/></td> <td>dnpDPCfg.xml</td> <td>Profile config values</td> </tr> </table>	<input type="checkbox"/>	dnpDP.xml	Complete Device Profile Device	<input type="checkbox"/>	dnpDPCap.xml	Profile Capabilities Device	<input type="checkbox"/>	dnpDPCfg.xml	Profile config values	<table border="0"> <tr> <td><input type="checkbox"/></td> <td>dnpDP.xml</td> </tr> <tr> <td><input type="checkbox"/></td> <td>dnpDPCap.xml</td> </tr> <tr> <td><input type="checkbox"/></td> <td>dnpDPCfg.xml</td> </tr> </table>	<input type="checkbox"/>	dnpDP.xml	<input type="checkbox"/>	dnpDPCap.xml	<input type="checkbox"/>	dnpDPCfg.xml														
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<p>1.1.12. External DNP3 XML files available Off-line:</p> <p><i>XML configuration file names that can be read or written from an external system, typically from a system that maintains the outstation configuration.</i></p> <p><i>External off-line XML file read permits an XML definition of a new configuration to be supplied from off-line configuration tools.</i></p> <p><i>External off-line XML file write permits an XML definition of a new configuration to be supplied to off-line configuration tools.</i></p>	<table border="0"> <thead> <tr> <th><u>Rd</u></th> <th><u>Wr</u></th> <th><u>Filename</u></th> <th><u>Description of Contents</u></th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDP.xml</td> <td>Complete Device Profile Device</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPCap.xml</td> <td>Profile Capabilities Device</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPCfg.xml</td> <td>Profile config values</td> </tr> </tbody> </table>	<u>Rd</u>	<u>Wr</u>	<u>Filename</u>	<u>Description of Contents</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	dnpDP.xml	Complete Device Profile Device	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPCap.xml	Profile Capabilities Device	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPCfg.xml	Profile config values	<table border="0"> <thead> <tr> <th><u>Rd</u></th> <th><u>Wr</u></th> <th><u>Filename</u></th> </tr> </thead> <tbody> <tr> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDP.xml</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPCap.xml</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPCfg.xml</td> </tr> </tbody> </table>	<u>Rd</u>	<u>Wr</u>	<u>Filename</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	dnpDP.xml	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPCap.xml	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPCfg.xml	
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<p>1.1.13. Connections Supported:</p> <p><i>If IP Networking is supported, both TCP and UDP are required to meet the requirements of DNP3 Specification Volume 7, IP</i></p>	<p><input checked="" type="checkbox"/> Serial (complete section 1.2)</p> <p><input checked="" type="checkbox"/> IP Networking (complete section 1.3)</p> <p><input type="checkbox"/> Other, explain:</p>		<p>software Smart view Vers ----- direct -----</p>																												

1.2. SERIAL CONNECTIONS	Capabilities	Current Value	If configurable list methods
1.2.1. Port Name: <i>The name associated with this serial port.</i>	-	X103	-
1.2.2. Serial Connection Parameters:	<input checked="" type="checkbox"/> Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bit, No Parity <input checked="" type="checkbox"/> Other, explain: Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bits, Even Parity Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bits, Odd Parity Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bits, No Parity Asynchronous - 8 Data Bits, 1 Start Bit, 2 Stop Bits, NO Parity	Asynchronous	software Smart view Vers ----- direct ----- .
1.2.3. Baud Rate:	<input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 <input type="checkbox"/> Configurable, other, describe:	19200	software Smart view Vers ----- direct ----- .
1.2.4. Hardware Flow Control (Handshaking):	<input checked="" type="checkbox"/> None RS-485 Options: <input checked="" type="checkbox"/> Requires Rx inactive before Tx <input type="checkbox"/> Other, explain:	RS-485Options: Requires Rx inactive before Tx	.
1.2.5. Interval to Request Link Status: <i>Indicates how often to send Data Link Layer status requests on a serial connection. This parameter is separate from the TCP Keep-alive timer.</i>	<input type="checkbox"/> Not Supported <input type="checkbox"/> Fixed at seconds <input checked="" type="checkbox"/> Configurable, range 0 to 120 seconds <input type="checkbox"/> Configurable, selectable from seconds <input type="checkbox"/> Configurable, other, describe:	0 seconds	.
1.2.6. Supports DNP3 Collision Avoidance: <i>Indicates whether an Outstation uses a collision avoidance algorithm.</i>	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, explain:	No	.

<p><i>Documentation provided by the vendor will provide information on collision avoidance schemes.</i></p>			
<p>1.2.7. Receiver Inter-character Timeout:</p> <p><i>When serial interfaces with asynchronous character framing are used, this parameter indicates if the receiver makes a check for gaps between characters. (i.e. extensions of the stop bit time of one character prior to the start bit of the following character within a message). If the receiver performs this check and the timeout is exceeded then the receiver discards the current data link frame. A receiver that does not discard data link frames on the basis of inter-character gaps is considered not to perform this check.</i></p> <p><i>Where no asynchronous serial interface is fitted this parameter is not applicable. In this case none of the options are selected.</i></p>	<p><input checked="" type="checkbox"/> Not Checked</p> <p><input type="checkbox"/> No gap permitted</p> <p><input type="checkbox"/> Fixed at bit times</p> <p><input type="checkbox"/> Fixed at ms</p> <p><input type="checkbox"/> Configurable, range to bit times</p> <p><input type="checkbox"/> Configurable, range to ms</p> <p><input type="checkbox"/> Configurable, selectable from bit times</p> <p><input type="checkbox"/> Configurable, selectable from ms</p> <p><input type="checkbox"/> Configurable, other, describe:</p> <p><input type="checkbox"/> Variable, explain:</p>	<p>Not Checked</p>	
<p>1.2.8. Inter-character gaps in transmission:</p> <p><i>When serial interfaces with asynchronous character framing are used, this parameter indicates whether extra delay is ever introduced between characters in the message, and if so, the maximum width of the gap.</i></p> <p><i>Where no asynchronous serial interface is fitted this parameter is not applicable. In this case none of the options are selected.</i></p>	<p><input checked="" type="checkbox"/> None (always transmits with no inter-character gap)</p> <p><input type="checkbox"/> Maximumbit times</p> <p><input type="checkbox"/> Maximumms</p>	<p>None</p>	

1.3. IP NETWORKING	Capabilities	Current Value	If configurable list methods
1.3.1. Port Name:	-	X100	-

<i>The name associated with this network port.</i>			
1.3.2. Type of End Point:	<input type="checkbox"/> TCP Initiating (Master Only) <input checked="" type="checkbox"/> TCP Listening (Outstation Only) <input type="checkbox"/> TCP Dual (required for Masters) <input checked="" type="checkbox"/> UDP Datagram (required)		software Smart view Vers ----- direct ----- .
1.3.3. IP Address of this Device:	-	see Device Para TCP/IP IP address	software Smart view Vers ----- direct ----- .
1.3.4. Subnet Mask:	-	see Device Para TCP/IP Default gateway	software Smart view Vers ----- direct ----- .
1.3.5. Gateway IP Address:	-	see Device Para TCP/IP Default gateway	software Smart view Vers ----- direct ----- .
1.3.6. Accepts TCP Connections or UDP Datagrams from:	<input checked="" type="checkbox"/> Allows all (show as *.*.*.* in 1.3.7) <input type="checkbox"/> Limits based on IP address <input type="checkbox"/> Limits based on list of IP addresses <input type="checkbox"/> Limits based on a wildcard IP address <input type="checkbox"/> Limits based on list of wildcard IP addresses <input type="checkbox"/> Other validation, explain:	Allows all	.
1.3.7. IP Address(es) from which TCP Connections or UDP Datagrams are accepted:	-	*.*.*.*	.
1.3.8. TCP Listen Port Number: <i>If Outstation or dual end point Mater, port number on which to listen for incoming TCP connect requests. Required to be configurable for Masters and recommended to be configurable for Outstations.</i>	<input type="checkbox"/> Not Applicable (Master w/o dual end point) <input type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1 to 65535 <input checked="" type="checkbox"/> Configurable, other, describe: Not recommended to use ports in private area 0	20000	software Smart view Vers ----- direct ----- .

	to 49152, and not possible to use private ports 52151 to 52162.		
1.3.9. TCP Listen Port Number of remote device: <i>If Master or dual end point Outstation, port number on remote device with which to initiate connection. Required to be configurable for Masters and recommended to be configurable for Outstations.</i>	<input checked="" type="checkbox"/> Not Applicable (Outstation w/o dual end point) <input type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:	Not Applicable	.
1.3.10. TCP Keep-alive timer: <i>The time period for the keep-alive timer on active TCP connections.</i>	<input type="checkbox"/> Fixed at ms <input checked="" type="checkbox"/> Configurable, range 1 to 7200ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe:	720 ms	software Smart view Vers ----- direct ----- .
1.3.11. Local UDP port: <i>Local UDP port for sending and/or receiving UDP datagrams. Masters may let system choose an available port. Outstations must use one that is known by the Master.</i>	<input type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1 to 65535 <input checked="" type="checkbox"/> Configurable, other, describe: Not recommended to use ports in private area 0 to 49152, and not possible to use private ports 52151 to 52162. <input type="checkbox"/> Let system choose (Master only)	20000	software Smart view Vers ----- direct ----- .
1.3.12. Destination UDP port for DNP3 Requests (Master Only):	-	-	.
1.3.13. Destination UDP port for initial unsolicited null responses (UDP only Outstations): <i>For a UDP only Outstation, the destination UDP port for sending initial unsolicited Null response.</i>	<input type="checkbox"/> None <input type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1 to 65535 <input checked="" type="checkbox"/> Configurable, other, describe: Not recommended to use ports in private area 0 to 49152, and not possible to use private ports 52151 to 52162.	same value as Local UDP Port (1.3.11)	software Smart view Vers ----- direct ----- .
1.3.14. Destination UDP port for responses: <i>For a UDP only Outstation, the destination UDP port for sending all responses other</i>	<input type="checkbox"/> None <input type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1 to 65535 <input checked="" type="checkbox"/> Configurable, other,	same value as Local UDP Port (1.3.11)	software Smart view Vers ----- direct

<p><i>than the initial unsolicited Null response.</i></p>	<p>describe: Not recommended to use ports in private area 0 to 49152, and not possible to use private ports 52151 to 52162.</p> <p><input type="checkbox"/> Use source port number</p>		----- .
<p>1.3.15. Multiple outstation connections (Masters only):</p> <p><i>Master only. Indicates whether multiple outstation connections are supported.</i></p>	<p><input type="checkbox"/> Supports multiple outstations (Masters only)</p>	-	.
<p>1.3.16. Multiple master connections (Outstations only):</p> <p><i>Outstations only. Indicates whether multiple master connections are supported and the method that can be used to establish connections.</i></p>	<p><input type="checkbox"/> Supports multiple masters (Outstations only)</p> <p>If supported, the following methods may be used:</p> <p><input type="checkbox"/> Method 1 (based on IP address) - required</p> <p><input type="checkbox"/> Method 2 (based on IP port number) - recommended</p> <p><input type="checkbox"/> Method 3 (browsing for static data) - optional</p>	Not supported	.
<p>1.3.17. Time synchronization support:</p>	<p><input checked="" type="checkbox"/> DNP3 Network method</p> <p><input checked="" type="checkbox"/> Other, explain: None, IRIG-B, SNTP</p> <p><input type="checkbox"/> Not Supported</p>	Other	software Smart view Vers ----- direct ----- .

1.4. LINK LAYER	Capabilities	Current Value	If configurable list methods
<p>1.4.1. Data Link Address:</p> <p><i>Indicates if the link address is configurable over the entire valid range of 0 to 65,519. Data link addresses 0xFFFF through 0xFFFF are reserved for broadcast or other special purposes.</i></p>	<p><input type="checkbox"/> Fixed at</p> <p><input checked="" type="checkbox"/> Configurable, range 0 to 65519</p> <p><input type="checkbox"/> Configurable, selectable from</p> <p><input type="checkbox"/> Configurable, other, describe:</p>	65500	software Smart view Vers ----- direct ----- .
<p>1.4.2. DNP3 Source Address Validation:</p> <p><i>Indicates whether the Outstation will filter out requests not from a specific source address.</i></p>	<p><input type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Always, one address allowed (shown in 1.4.3)</p> <p><input type="checkbox"/> Always, any one of multiple addresses allowed (each selectable as shown in 1.4.3)</p> <p><input type="checkbox"/> Sometimes, explain:</p>	Always - single address	.
	<p><input type="checkbox"/> Configurable to any 16 bit DNP Data Link Address value</p>	1	software Smart view

<p>1.4.3. DNP3 Source Address (es) expected when Validation is Enabled:</p> <p><i>Selects the allowed source address(es)</i></p>	<p><input checked="" type="checkbox"/> Configurable, range 0 to 65519</p> <p><input type="checkbox"/> Configurable, selectable from</p> <p><input type="checkbox"/> Configurable, other, describe:</p>		<p>Vers</p> <p>-----</p> <p>direct</p> <p>-----</p> <p>.</p>
<p>1.4.4. Self Address Support using address 0xFFFC:</p> <p><i>If an Outstation receives a message with a destination address of 0xFFFC it shall respond normally with its own source address. It must be possible to diasble this feature if supported.</i></p>	<p><input checked="" type="checkbox"/> Yes (only allowed if configurable)</p> <p><input checked="" type="checkbox"/> No</p>	<p>No</p>	<p>software</p> <p>Smart view</p> <p>Vers</p> <p>-----</p> <p>direct</p> <p>-----</p> <p>.</p>
<p>1.4.5. Sends Confirmed User Data Frames:</p> <p><i>A list of conditions under which the device transmits confirmed link layer services (TEST_LINK_STATES, RESET_LINK_STATES, CONFIRMED_USER_DATA).</i></p>	<p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> Always</p> <p><input checked="" type="checkbox"/> Sometimes, explain:Depends on DataLinkConfirm setting</p>	<p>Sometimes</p>	<p>software</p> <p>Vers</p> <p>-----</p> <p>direct</p> <p>-----</p> <p>.</p>
<p>1.4.6. Data Link Layer Confirmation Timeout:</p> <p><i>This timeout applies to any secondary data link message that requires a confirm or response (link reset, link status, user data, etc).</i></p>	<p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Fixed at ms</p> <p><input checked="" type="checkbox"/> Configurable, range 100 to 10000ms</p> <p><input type="checkbox"/> Configurable, selectable from ms</p> <p><input type="checkbox"/> Configurable, other, describe:</p> <p><input type="checkbox"/> Variable, explain:</p>	<p>1000 ms</p>	<p>software</p> <p>Vers</p> <p>-----</p> <p>direct</p> <p>-----</p> <p>.</p>
<p>1.4.7. Maximum Data Link Retries:</p> <p><i>The number of times the device will retransmit a frame that requests Link Layer confirmation.</i></p>	<p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Fixed at</p> <p><input checked="" type="checkbox"/> Configurable, range 0 to 255</p> <p><input type="checkbox"/> Configurable, selectable from</p> <p><input type="checkbox"/> Configurable, other, describe:</p>	<p>1</p>	<p>software</p> <p>Vers</p> <p>-----</p> <p>direct</p> <p>-----</p> <p>.</p>
<p>1.4.8. Maximum number of octets Transmitted in a Data Link Frame:</p> <p><i>This number includes the CRCs. With a length field of 255, the maximum size would be 292.</i></p>	<p><input checked="" type="checkbox"/> Fixed at 292</p> <p><input type="checkbox"/> Configurable, range to</p> <p><input type="checkbox"/> Configurable, selectable from</p> <p><input type="checkbox"/> Configurable, other, describe:</p>		<p>.</p>
<p>1.4.9. Maximum number of octets that can be Received in a Data Link Frame:</p>	<p><input checked="" type="checkbox"/> Fixed at 292</p> <p><input type="checkbox"/> Configurable, range to</p> <p><input type="checkbox"/> Configurable, selectable</p>		<p>.</p>

<p><i>This number includes the CRCs. With a field length of 255, the maximum size would be 292. The device must be able to receive 292 octets to be compliant.</i></p>	<p>from <input type="checkbox"/> Configurable, other, describe:</p>		
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1.5. APPLICATION LAYER	Capabilities	Current Value	If configurable list methods
<p>1.5.1. Maximum number of octets Transmitted in an Application Layer Fragment other than File Transfer:</p> <p><i>This size does not include any transport or frame octets. - Masters must provide a setting less than or equal to 249. - Outstations must provide a setting less than or equal to 2048.</i></p>	<p><input checked="" type="checkbox"/> Fixed at 2048 <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:</p>	2048	.
<p>1.5.2. Maximum number of octets Transmitted in an Application Layer Fragment containing File Transfer:</p>	<p><input checked="" type="checkbox"/> Fixed at 2048 <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:</p>	2048	.
<p>1.5.3. Maximum number of octets that can be received in an Application Layer Fragment:</p> <p><i>This size does not include any transport or frame octets. - Masters must provide a setting greater than or equal to 2048. - Outstations must provide a setting greater than or equal to 249.</i></p>	<p><input checked="" type="checkbox"/> Fixed at 2048 <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:</p>	2048	.
<p>1.5.4. Timeout waiting for Complete Application Layer Fragment:</p> <p><i>Timeout if all frames of a message fragment are not received in the specified time. Measured from time first frame of a fragment is received until the last frame is received.</i></p>	<p><input checked="" type="checkbox"/> None <input type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:</p>	ms	.
<p>1.5.5. Maximum number of objects allowed in a single</p>	<p><input type="checkbox"/> Fixed at (enter 0 if controls are not supported)</p>		.

control request for CROB (Group 12):	<input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input checked="" type="checkbox"/> Configurable, other, describe: The maximum Number of objects allowed in a single Control Request for CROB is only limited by the maximum length of a data link frame. <input type="checkbox"/> Variable, explain:		
1.5.6. Maximum number of objects allowed in a single control request for Analog Outputs (Group 41):	<input type="checkbox"/> Fixed at (enter 0 if controls are not supported) <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:		
1.5.7. Maximum number of objects allowed in a single control request for Data Sets (Groups 85, 86, 87):	<input type="checkbox"/> Fixed at (enter 0 if controls are not supported) <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:		
1.5.8. Supports mixed object groups (AOBs, CROBs and Data Sets) in the same control request:	<input type="checkbox"/> Not applicable - controls are not supported <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	No	

1.6. FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable list methods
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1.7. FILL OUT THE FOLLOWING ITEMS FOR OUTSTATIONS ONLY	Capabilities	Current Value	If configurable list methods
1.7.1. Timeout waiting for Application Confirm of solicited response message:	<input type="checkbox"/> None <input type="checkbox"/> Fixed at ms <input checked="" type="checkbox"/> Configurable, range 100 to 10000ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:	5000 ms	software Vers ----- direct -----
1.7.2. How often is time synchronization required from the master:	<input type="checkbox"/> Never needs time <input type="checkbox"/> Within seconds after IIN1.4 is set		

	<input checked="" type="checkbox"/> Periodically every 60 seconds		
1.7.3. Device Trouble Bit IIN1.6: <i>If IIN1.6 device trouble bit is set under certain conditions, explain the possible causes.</i>	<input checked="" type="checkbox"/> Never used <input type="checkbox"/> Reason for setting:		
1.7.4. File Handle Timeout: <i>If there is no activity referencing a file handle for a configurable length of time, the outstation must do an automatic close on the file. The timeout value must be configurable up to 1 hour. When this condition occurs the outstation will send a File Transport Status Object (obj grp 70 var 6) using a status code value of handle expired (0x02).</i>	<input checked="" type="checkbox"/> Not applicable, files not supported <input type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:		
1.7.5. Event Buffer Overflow Behaviour:	<input type="checkbox"/> Discard the oldest event <input checked="" type="checkbox"/> Discard the newest event <input type="checkbox"/> Other, explain:	Discard newest	
1.7.6. Event Buffer Organization: <i>Explain how event buffers are arranged (per Object Group, per Class, single buffer etc) and provide their sizes.</i>	Events with timestamp and without timestamp are stored in different buffers. Events without timestamp are reported first.	Events with timestamp and without timestamp are stored in different buffers. Events without timestamp are reported first.	
1.7.7. Sends Multi-Fragment Responses: <i>Indicates whether an Outstation sends multi-fragment responses (Masters do not send multi-fragment requests).</i>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Yes	
1.7.8. DNP Command Settings preserved through a device reset: <i>If any of these settings are written through the DNP protocol and they are not preserved through a restart of the Outstation, the Master will have to write them again anytime the Restart IIN is set.</i>	<input checked="" type="checkbox"/> Assign Class <input type="checkbox"/> Analog Deadbands <input type="checkbox"/> Data Set Prototypes <input type="checkbox"/> Data Set Descriptors	Assign Class	

<p>1.7.9 Function Code 31, Activate Configuration:</p> <p><i>Indicate whether FC31 is supported. If it is supported, does the outstation save configuration or code to non-volatile memory when command is received?</i></p>	<input type="checkbox"/> Supports Function Code 31 <input type="checkbox"/> Saves to non-volatile storage		
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1.8. OUTSTATION UNSOLICITED RESPONSE SUPPORT	Capabilities	Current Value	If configurable list methods
<p>1.8.1. Supports Unsolicited Reporting:</p> <p><i>When the unsolicited response mode is configured "off", the device is to behave exactly like an equivalent device that has no support for unsolicited responses. If set to "on", the Outstation will send a null Unsolicited Response after it restarts, then wait for an Enable Unsolicited Response command from the master before sending additional Unsolicited Responses containing event data.</i></p>	<input type="checkbox"/> Not Supported <input checked="" type="checkbox"/> Configurable, selectable from On and Off	Off	software Vers ----- direct ----- .
<p>1.8.2. Master Data Link Address:</p> <p><i>The destination address of the master device where the unsolicited responses will be sent.</i></p>	<input type="checkbox"/> Fixed at <input checked="" type="checkbox"/> Configurable, range 0 to 65519 <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:	65500	software Vers ----- direct ----- .
<p>1.8.3. Unsolicited Response Confirmation Timeout:</p> <p><i>This is the amount of time that the outstation will wait for an Application Layer confirmation back from the master indicating that the master received the unsolicited response message. As a minimum, the range of configurable values must include times from one second to one minute. This parameter may be the same one that is used for normal, solicited, application confirmation</i></p>	<input type="checkbox"/> Fixed at ms <input checked="" type="checkbox"/> Configurable, range 1000 to 60000 ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain:	10000 ms	software Vers ----- direct ----- .

<i>timeouts, or it may be a separate parameter.</i>			
<p>1.8.4. Number of Unsolicited Retries:</p> <p><i>This is the number of retries that an outstation transmits in each unsolicited response series if it does not receive confirmation back from the master. The configured value includes identical and regenerated retry messages. One of the choices must provide for an indefinite (and potentially infinite) number of transmissions.</i></p>	<input type="checkbox"/> None <input type="checkbox"/> Fixed at ms <input checked="" type="checkbox"/> Configurable, range 0 to 255ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Always infinite, never gives up	2	software Vers ----- direct ----- .

1.9. OUTSTATION UNSOLICITED RESPONSE TRIGGER CONDITIONS	Capabilities	Current Value	If configurable list methods
1.9.1. Number of class 1 events:	<input type="checkbox"/> Class 1 not used to trigger Unsolicited Responses <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1, Off <input type="checkbox"/> Configurable, other, describe:	Off	software Vers ----- direct ----- .
1.9.2. Number of class 2 events:	<input type="checkbox"/> Class 2 not used to trigger Unsolicited Responses <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1, Off <input type="checkbox"/> Configurable, other, describe:	Off	software Vers ----- direct ----- .
1.9.3. Number of class 3 events:	<input type="checkbox"/> Class 3 not used to trigger Unsolicited Responses <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input checked="" type="checkbox"/> Configurable, selectable from 1, Off <input type="checkbox"/> Configurable, other, describe:	Off	software Vers ----- direct ----- .
1.9.4. Total number of events from any class:	<input checked="" type="checkbox"/> Total Number of Events not used to trigger Unsolicited Responses <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from		.

	<input type="checkbox"/> Configurable, other, describe:		
1.9.5. Hold time after class 1 event: <i>A configurable value of 0 indicates that responses are not delayed due to this parameter.</i>	<input type="checkbox"/> Class 1 not used to trigger Unsolicited Responses <input checked="" type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe:	0 ms	.
1.9.6. Hold time after class 2 event: <i>A configurable value of 0 indicates that responses are not delayed due to this parameter.</i>	<input type="checkbox"/> Class 2 not used to trigger Unsolicited Responses <input checked="" type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe:	0 ms	.
1.9.7. Hold time after class 3 event: <i>A configurable value of 0 indicates that responses are not delayed due to this parameter.</i>	<input type="checkbox"/> Class 3 not used to trigger Unsolicited Responses <input checked="" type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe:	0 ms	.
1.9.8. Hold time after event assigned to any class: <i>A configurable value of 0 indicates that responses are not delayed due to this parameter.</i>	<input type="checkbox"/> Class events not used to trigger Unsolicited Responses <input checked="" type="checkbox"/> Fixed at ms <input type="checkbox"/> Configurable, range to ms <input type="checkbox"/> Configurable, selectable from ms <input type="checkbox"/> Configurable, other, describe:	0 ms	.
1.9.9. Retrigger Hold Time: <i>The hold-time timer may be retriggered for each new event detected (increased possibility of capturing all the changes in a single response) or not retriggered (giving the master a guaranteed update time).</i>	<input type="checkbox"/> Hold-time timer will be retriggered for each new event detected (may get more changes in next response) <input checked="" type="checkbox"/> Hold-time timer will not be retriggered for each new event detected (guaranteed update time)	Not retriggered	.
1.9.10. Other Unsolicited Response Trigger Conditions:	<input type="checkbox"/>		.

1.10. OUTSTATION PERFORMANCE	Capabilities	Current Value	If configurable list methods
	-	1 ms	-

<p>1.10.1. Maximum Time Base Drift (milliseconds per minute):</p> <p><i>If the device is synchronized by DNP, what is the clock drift rate over the full operating temperature range.</i></p>			
<p>1.10.2. When does outstation set IIN1.4?</p>	<p><input checked="" type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Asserted at startup until first Time Synchronization request received</p> <p><input checked="" type="checkbox"/> Periodically, range 60s to 60s seconds</p> <p><input type="checkbox"/> Periodically, selectable from seconds</p> <p><input type="checkbox"/> Range to seconds after last time sync</p> <p><input type="checkbox"/> Selectable from seconds after last time sync</p> <p><input type="checkbox"/> When time error may have drifted by range to ms</p> <p><input type="checkbox"/> When time error may have drifted by selectable from ms</p>	<p>Never</p>	<p>-</p>
<p>1.10.3. Maximum Internal Time Reference Error when set via DNP (ms):</p> <p><i>The difference between the time set in DNP Write Time message, and the time actually set in the outstation.</i></p>	<p>-</p>	<p>1 ms</p>	<p>-</p>
<p>1.10.4. Maximum Delay Measurement Error (ms):</p> <p><i>The difference between the time reported in the delay measurement response and the actual time between receipt of the delay measurement request and issuing the delay measurement reply.</i></p>	<p>-</p>	<p>1 ms</p>	<p>-</p>
<p>1.10.5. Maximum Response Time (ms):</p> <p><i>The amount of time an outstation will take to respond upon receipt of a valid request. This does not include the message transmission time.</i></p>	<p>-</p>	<p>50 ms</p>	<p>-</p>
<p>1.10.6. Maximum time from start-up to IIN 1.4 assertion (ms):</p>	<p>-</p>	<p>15 ms</p>	<p>-</p>

1.10.7. Maximum Event Time-tag error for local Binary and Double Bit I/O (ms): <i>The error between the time-tag reported and the absolute time of the physical event. This error includes the Internal Time Reference Error.</i>	-	100 ms	-
1.10.8. Maximum Event Time-tag error for local I/O other than Binary and Double Bit data types (ms):	-	100 ms	-

1.11. INDIVIDUAL FIELD OUTSTATION PARAMETERS	Value of Current Setting	If configurable list methods
1.11.1. User-assigned location name or code string (same as g0v245):		.
1.11.2. User-assigned ID code/number string (same as g0v246):		.
1.11.3 User-assigned name string for the outstation (same as g0v247):		.
1.11.4 Device Serial Number string (same as g0v248):		.

2. Mapping to IEC 61850 Object Models

This optional section allows each configuration parameter or point in the DNP Data map to be tied to an attribute in the IEC 61850 object models. The IEC 61850 mappings are stored in the XML version of the Device Profile Document as a list of XPath references to the tags representing real-time data from DNP under each point (for example value, timestamp, and quality for Analog inputs) paired with an IEC 61850 Object Reference in the form of a flattened ACSI (Abstract Communications Service Interface) name of the object and attributes as specified in IEC 61850 parts 7-4 and 7-3. The Xpath reference into the DNP XML file may also contain a reference to a constant value, a formula or conditional expression involving one or more XML tags, or a reference to a configuration parameter that is not associated with a particular data point.

A graphical or table representation may be generated from the XML and shown here in the Device Profile Document. The following is an example table format.

MAPPING TO IEC 61850 OBJECT MODELS

3. Capabilities and Current Settings for Device Database

The following tables identify the capabilities and current settings for each DNP3 data type. Each data type also provides a table defining the data points available in the device or a description of how this information can be obtained if the database is configurable.

3.1. BINARY INPUT POINTS			
Static (Steady-State) Object Number: 1			
Event Object Number: 2			
	Capabilities	Current Value	If configurable list methods
3.1.1. Static Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - Single-bit packed format <input checked="" type="checkbox"/> Variation 2 - Single-bit with flag <input type="checkbox"/> Based on point index	One	.
3.1.2. Event Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - without time <input checked="" type="checkbox"/> Variation 2 - with absolute time <input checked="" type="checkbox"/> Variation 3 - with relative time <input type="checkbox"/> Based on point index	Two	.
3.1.3. Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i> <i>All events are typically reported for Binary Inputs</i>	<input type="checkbox"/> Only most recent <input checked="" type="checkbox"/> All events	All events	.
3.1.4. Binary Inputs included in Class 0 response:	<input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index	Always	.
3.1.5. Definition of Binary Input Point List: <i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	<input type="checkbox"/> Fixed, list shown in table below <input checked="" type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:	Configurable	software Vers ----- direct ----- .

Binary Input points list:

Point Index	Name	Default class Assign	Name for State when value is 0	Name for State when value is 1	Description

0	Binary Input Point 0	one	Depends on the selected status bit	Depends on the selected status bit	User configurable binary Input (select value from a list of status bits)
...					
63	Binary Input Point 63	one	Depends on the selected status bit	Depends on the selected status bit	User configurable binary Input (select value from a list of status bits)

3.2. DOUBLE-BIT INPUT POINTS

Static (Steady-State) Object Number: 3

Event Object Number: 4

	Capabilities	Current Value	If configurable list methods
3.2.1. Static Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - Double-bit packed format <input checked="" type="checkbox"/> Variation 2 - Double-bit with flag <input type="checkbox"/> Based on point index	One	.
3.2.2. Event Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - without time <input checked="" type="checkbox"/> Variation 2 - with absolute time <input checked="" type="checkbox"/> Variation 3 - with relative time <input type="checkbox"/> Based on point index	One	.
3.2.3. Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all</i>	<input type="checkbox"/> Only most recent <input checked="" type="checkbox"/> All events	All events	.

<i>events or only the most recent event. All events are typically reported for Double Bit Inputs</i>			
3.2.4. Double Bit Inputs included in Class 0 response:	<input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index	Always	.
3.2.5. Definition of Double Bit Input Point List: <i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	<input type="checkbox"/> Fixed, list shown in table below <input checked="" type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:	Configurable	software Vers ----- direct ----- .

Double-bit Input points list:

Point Index	Name	Default class Assigned to Events (1, 2, 3 or none)	Name for State when value is 0 (intermediate)	Name for State when value is 1 (off)	Name for State when value is 2 (on)	Name for State when value is 3 (indeterminate)	Description
0	Double Bit Input Point 0	one	In transit	Open	Closed	Faulty	User configurable double bit Input (select breaker from a list)
...							
6	Double Bit Input Point6	one	In transit	Open	Closed	Faulty	User configurable double bit Input (select breaker from a list)

3.3. BINARY OUTPUT STATUS AND CONTROL RELAY OUTPUT BLOCK

Binary Output Status Object Number: 10

Binary Output Event Object Number: 11

CROB Object Number: 12

Binary Output Command Event Object Number: 13

.	Capabilities	Current Value	
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			If configurable list methods
3.3.1. Minimum pulse time allowed with Trip, Close and Pulse On commands.	<input checked="" type="checkbox"/> Fixed at ms (hardware may limit this further) <input type="checkbox"/> Based on point index		.
3.3.2. Maximum pulse time allowed with Trip, Close and Pulse On commands.	<input checked="" type="checkbox"/> Fixed at ms (hardware may limit this further) <input type="checkbox"/> Based on point index		.
3.3.3. Binary Output Status included in Class 0 response:	<input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index	Always	.
3.3.4. Reports Output Command Event Objects:	<input checked="" type="checkbox"/> Never <input type="checkbox"/> Only upon a successful Control <input type="checkbox"/> Upon all control attempts	Never	.
3.3.5. Event Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - without time <input checked="" type="checkbox"/> Variation 2 - with absolute time <input type="checkbox"/> Based on point index	One	.
3.3.6. Command Event Variation reported when variation 0 requested	<input type="checkbox"/> Variation 1 - without time <input type="checkbox"/> Variation 2 - with absolute time <input type="checkbox"/> Based on point index		.
3.3.7. Change Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		.
3.3.8. Command Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		.
3.3.9. Maximum Time between Select and Operate:	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Fixed at seconds <input checked="" type="checkbox"/> Configurable, range to seconds <input type="checkbox"/> Configurable, selectable from seconds <input type="checkbox"/> Configurable, other,	1 to 60 seconds	.

	describe: <input type="checkbox"/> Variable, explain: <input type="checkbox"/> Based on point index		
3.3.10. Definition of Binary Output Status / Control Relay Output Block Points List: <i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	<input type="checkbox"/> Fixed, list shown in table below <input checked="" type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:	Configurable	software Vers ----- direct ----- .

Binary Output Status and CROB points list:

Point Index	Name	Supported Control Operations										Name for State when value is 0	Name for State when value is 1	Default Class Assigned to Events (1,2,3 or none)		Description
		Select/Operate	Direct Operate	Direct Operate - No Ack	Pulse On	Pulse Off	Latch On	Latch Off	Trip / Close	Count > 1	Cancel Currently Running Operation			Change	Command	
0	Binary Output Point 0	Y	Y	Y	Y	-	-	-	-	-	-	inactive	active	none	none	Single bit state set by DNP Binary Output Point 0
...		-	-	-	-	-	-	-	-	-	-					
31	Binary Output Point 31	Y	Y	Y	Y	-	-	-	-	-	-	inactive	active	none	none	Single bit state set by DNP Binary Output Point 31

3.4. COUNTERS / FROZEN COUNTERS
Static Counter Object Number: 20
Static Frozen Counter Object Number: 21
Counter Event Object Number: 22
Frozen Counter Event Object Number: 23

	Capabilities	Current Value	If configurable list methods
3.4.1. Static Counter Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - 32-bit with flag <input checked="" type="checkbox"/> Variation 2 - 16-bit with flag <input checked="" type="checkbox"/> Variation 5 - 32-bit without flag <input checked="" type="checkbox"/> Variation 6 - 16-bit without flag <input type="checkbox"/> Based on point index	One	.
3.4.2. Counter Event Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - 32-bit with flag <input checked="" type="checkbox"/> Variation 2 - 16-bit with flag <input checked="" type="checkbox"/> Variation 5 - 32-bit with flag and time <input checked="" type="checkbox"/> Variation 6 - 16-bit with flag and time <input type="checkbox"/> Based on point index	One	.
3.4.3. Counters included in Class 0 response: <i>If counters are not included in the Class 0 response, Counter Events (group 22) may not be reported.</i>	<input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index	Always	.
3.4.4. Counter Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. All events are typically reported for Counters</i>	<input checked="" type="checkbox"/> Only most recent <input type="checkbox"/> All events	Most recent	.
3.4.5. Static Frozen Counter Variation reported when variation 0 requested:	<input type="checkbox"/> Variation 1 - 32-bit with flag <input type="checkbox"/> Variation 2 - 16-bit with flag <input type="checkbox"/> Variation 5 - 32-bit with flag and time <input type="checkbox"/> Variation 6 - 16-bit with flag and time <input type="checkbox"/> Variation 9 - 32-bit without flag <input type="checkbox"/> Variation 10 - 16-bit without flag <input type="checkbox"/> Based on point index		.
			.

3.4.6. Frozen Counter Event Variation reported when variation 0 requested:	<input type="checkbox"/> Variation 1 - 32-bit with flag <input type="checkbox"/> Variation 2 - 16-bit with flag <input type="checkbox"/> Variation 5 - 32-bit without flag <input type="checkbox"/> Variation 6 - 16-bit without flag <input type="checkbox"/> Based on point index		
3.4.7. Frozen Counters included in Class 0 response:	<input type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index		
3.4.8. Frozen Counter Event reporting mode: <i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event. All events are typically reported for Frozen counters</i>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		
3.4.9. Counters Roll Over at:	<input type="checkbox"/> 16 Bits (65,535) <input type="checkbox"/> 32 Bits (4,294,967,295) <input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input checked="" type="checkbox"/> Configurable, other, describe: Based on selected counter <input type="checkbox"/> Based on point index	Other	
3.4.10. Counters frozen by means of:	<input type="checkbox"/> Master Request <input type="checkbox"/> Freezes itself without concern for time of day <input type="checkbox"/> Freezes itself and requires time of day <input type="checkbox"/> Other, explain:		
3.4.11. Definition of Counter / Frozen Counter Point List: <i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	<input type="checkbox"/> Fixed, list shown in table below <input checked="" type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:	Configurable	software Vers ----- direct -----

Counter / Frozen Counter points list:

Point	Name	Defat	Proze	Defat	Description
-------	------	-------	-------	-------	-------------

0	Binary Counter Point 0	three	-		User configurable binary cuonter (select value from a list of counters)
...			-		
8	Binary Counter Point 8	three	-		User configurable binary cuonter (select value from a list of counters)

3.5. ANALOG INPUT POINTS

Static (Steady-State) Object Number: 30

Event Object Number: 32

	Capabilities	Current Value	If configurable list methods
3.5.1. Static Variation reported when variation 0 requested	<input checked="" type="checkbox"/> Variation 1 - 32-bit with flag <input checked="" type="checkbox"/> Variation 2 - 16-bit with flag <input checked="" type="checkbox"/> Variation 3 - 32-bit without flag <input checked="" type="checkbox"/> Variation 4 - 16-bit without flag <input type="checkbox"/> Variation 5 - single-precision floating point with flag <input type="checkbox"/> Variation 6 - double-precision floating point with flag <input type="checkbox"/> Based on point index	One	.
		One	.

<p>3.5.2. Event Variation reported when variation 0 requested</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Variation 1 - 32-bit without time <input checked="" type="checkbox"/> Variation 2 - 16-bit without time <input checked="" type="checkbox"/> Variation 3 - 32-bit with time <input checked="" type="checkbox"/> Variation 4 - 16-bit with time <input type="checkbox"/> Variation 5 - single-precision floating point w/o time <input type="checkbox"/> Variation 6 - double-precision floating point w/o time <input type="checkbox"/> Variation 7 - single-precision floating point with time <input type="checkbox"/> Variation 8 - double-precision floating point with time <input type="checkbox"/> Based on point index 		
<p>3.5.3. Event reporting mode:</p> <p><i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i></p> <p><i>Only the most recent event is typically reported for Analog Inputs</i></p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Only most recent <input type="checkbox"/> All events 	<p>Most recent</p>	
<p>3.5.4. Analog Inputs included in Class 0 response:</p> <p><i>If Analog Inputs are not included in the Class 0 response, Analog Input Events (group 32) may not be reported.</i></p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index 	<p>Always</p>	
<p>3.5.5. How Deadbands are set:</p>	<ul style="list-style-type: none"> <input type="checkbox"/> A. Global Fixed <input type="checkbox"/> B. Configurable through DNP <input checked="" type="checkbox"/> C. Configurable via other means <input type="checkbox"/> D. Other, explain: <input type="checkbox"/> Based on point index - column specifies which of the options applies B, C or D 	<p>C</p>	<p>software Vers ----- direct -----</p>
<p>3.5.6. Analog Deadband Algorithm:</p> <p>simple- just compares the difference from</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Simple <input checked="" type="checkbox"/> Integrating <input type="checkbox"/> Other, explain: 	<p>Integrating</p>	<p>software Vers ----- direct</p>

the previous reported value			-----
integrating- keeps track of the accumulated change			.
other- indicating another algorithm			
3.5.7. Definition of Analog Input Point List: <i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	<input type="checkbox"/> Fixed, list shown in table below <input checked="" type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:	Configurable	software Vers ----- direct -----

Analog Input points list:

		Transmitted Value		Scaling					
Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Min	Max	Multiplier	Offset	Units	Resolution	Description
0	Analog Input Point 0	two	-	-	Configurable between 0.001 and 1000000	0.0	Based on selected value	1	User configurable analog input (select value from a list of measured values)
...			-	-					
31	Analog Input Point 31	two	-	-	Configurable between 0.001 and 1000000	0.0	Based on selected value	1	User configurable analog input (select value from a list of measured values)

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3.6. ANALOG OUTPUT STATUS AND ANALOG OUTPUT CONTROL BLOCK

Analog Output Status Object Number: 40

Analog Output Control Block Object Number: 41

Analog Output Event Object Number: 42

Analog Output Command Event Object Number: 43

	Capabilities	Current Value	If configurable list methods
3.6.1. Static Analog Output Status Variation reported when variation 0 requested	<input type="checkbox"/> Variation 1 - 32-bit with flag <input type="checkbox"/> Variation 2 - 16-bit with flag <input type="checkbox"/> Variation 3 - single-precision floating point with flag <input type="checkbox"/> Variation 4 - double-precision floating point with flag <input type="checkbox"/> Based on point index		
3.6.2. Analog Output Status included in Class 0 response: <i>If Analog Output Status points are not included in the Class 0 response, Analog Output Events (group 42) may not be reported.</i>	<input type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index		
3.6.3. Reports Output Command Event Objects:	<input type="checkbox"/> Never <input type="checkbox"/> Only upon a successful Control <input type="checkbox"/> Upon all control attempts		
3.6.4. Event Variation reported when variation 0 requested	<input type="checkbox"/> Variation 1 - 32-bit without time <input type="checkbox"/> Variation 2 - 16-bit without time <input type="checkbox"/> Variation 3 - 32-bit with time <input type="checkbox"/> Variation 4 - 16-bit with time <input type="checkbox"/> Variation 5 - single-precision floating point w/o time <input type="checkbox"/> Variation 6 - double-precision floating point w/o time <input type="checkbox"/> Variation 7 - single-precision floating point with time <input type="checkbox"/> Variation 8 - double-precision floating point with time <input type="checkbox"/> Based on point index		

<p>3.6.5. Command Event Variation reported when variation 0 requested</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Variation 1 - 32-bit without time <input type="checkbox"/> Variation 2 - 16-bit without time <input type="checkbox"/> Variation 3 - 32-bit with time <input type="checkbox"/> Variation 4 - 16-bit with time <input type="checkbox"/> Variation 5 - single-precision floating point w/o time <input type="checkbox"/> Variation 6 - double-precision floating point w/o time <input type="checkbox"/> Variation 7 - single-precision floating point with time <input type="checkbox"/> Variation 8 - double-precision floating point with time <input type="checkbox"/> Based on point index 		
<p>3.6.6. Change Event reporting mode:</p> <p><i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Only most recent <input type="checkbox"/> All events 		
<p>3.6.7. Command Event reporting mode:</p> <p><i>When responding with event data and more than one event has occurred for a data point, an Outstation may include all events or only the most recent event.</i></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Only most recent <input type="checkbox"/> All events 		
<p>3.6.8. Maximum Time between Select and Operate:</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Not Applicable <input type="checkbox"/> Fixed at seconds <input type="checkbox"/> Configurable, range to seconds <input type="checkbox"/> Configurable, selectable from seconds <input type="checkbox"/> Configurable, other, describe: <input type="checkbox"/> Variable, explain: <input type="checkbox"/> Based on point index 		
<p>3.6.9. Definition of Analog Output Status / Analog Output Block Point List:</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Fixed, list shown in table below <input type="checkbox"/> Configurable (current list 		

<i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i>	may be shown in table below) <input type="checkbox"/> Other, explain:	
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Analog Output points list:

		Supported Control Operations			Transmitted Value		Scaling		Default Class Assigned to Events (1, 2, 3 or none)				
Point Index	Name	Select/Operate	Direct Operate	Direct Operate - No Ack	Min	Max	Min	Max	Units	Resolution	Change	Command	Description
		-	-	-	-	-	-	-					

3.7. SEQUENTIAL FILE TRANSFER
Object Number: 70

	Capabilities	Current Value	If configurable list methods
3.7.1. File Transfer Supported:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (do not complete any further entries in section 3.7)		
3.7.2. File Authentication: <i>Indicates whether a valid authentication key must be obtained prior to open and delete requests.</i>	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes, explain <input type="checkbox"/> Never		
3.7.3. File Append Mode: <i>Indicates if a file can be opened and appended to versus just overwritten.</i>	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes, explain <input type="checkbox"/> Never		
3.7.4. Permissions Support: <i>Indicates the device is capable of using the indicated permissions.</i>	<input type="checkbox"/> Owner Read Allowed: 0x0100 <input type="checkbox"/> Owner Write Allowed: 0x0080 <input type="checkbox"/> Owner Execute Allowed: 0x0040 <input type="checkbox"/> Group Read Allowed: 0x0020 <input type="checkbox"/> Group Write Allowed:		

	0x0010 <input type="checkbox"/> Group Execute Allowed: 0x0008 <input type="checkbox"/> World Read Allowed: 0x0004 <input type="checkbox"/> World Write Allowed: 0x0002 <input type="checkbox"/> World Execute Allowed: 0x0001		
3.7.5. Multiple Blocks in a Fragment: <i>File data is transferred in a series of blocks of a maximum specified size. This indicates whether only a single block or multiple blocks will be sent in fragment.</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3.7.6. Max number of Files Open at one time:	<input type="checkbox"/> Fixed at <input type="checkbox"/> Configurable, range to <input type="checkbox"/> Configurable, selectable from <input type="checkbox"/> Configurable, other, describe:		
3.7.7. Definition of File Names that may be read or written:	<input type="checkbox"/> Fixed, list shown in table below <input type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:		

Sequential Files list:

		Authentication Required for:			
File Name	Default Class Assigned to Events (1, 2, 3 or none)	Read	Write	Delete	Description
		-	-	-	

3.8. OCTET STRING POINTS

Static (Steady-State) Object Number: 110

Event Object Number: 111

	Capabilities	Current Value	If configurable list methods
3.8.1. Event reporting mode: <i>When responding with event data and more than one event</i>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		

<i>has occurred for a data point, an Outstation may include all events or only the most recent event.</i>			
<p>3.8.2. Octet Strings included in Class 0 response:</p> <p><i>If Octet Strings are not included in the Class 0 response, Octet String Events (group 111) may not be reported.</i></p>	<input type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index		
<p>3.8.3. Definition of Octet String Point List:</p> <p><i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i></p>	<input type="checkbox"/> Fixed, list shown in table below <input type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:		

Octet String points list:

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Description

3.9. VIRTUAL TERMINAL PORT NUMBERS (POINTS)

Static (Steady-State) Object Number: 112

Event Object Number: 113

	Capabilities	Current Value	If configurable list methods
<p>3.9.1. Definition of Virtual Terminal Port Numbers:</p> <p><i>List of addressable points. Points that do not exist (for example, because an option is not installed) are omitted from the table.</i></p>	<input type="checkbox"/> Fixed, list shown in table below <input type="checkbox"/> Configurable (current list may be shown in table below) <input type="checkbox"/> Other, explain:		

Ports list:

Virtual Port Number ()	Name	Default Class Assigned to Events (1, 2, 3 or none)	Description

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3.10. DATA SET PROTOTYPE
Object Number: 85
Variation Number: 1

	Capabilities	Current Value	If configurable list methods
3.10.1. Definition of Data Set Prototypes:	<input type="checkbox"/> Fixed, a Data Set Descriptor is shown in table below <input type="checkbox"/> Configurable (a currently defined Data Set Prototype may be shown in table below) <input type="checkbox"/> Other, explain:		
3.10.2. Description:		This is a dataset prototype	

Element Number	Descriptor Code	Element Description	Data Type Code	Max Data Length	Ancillary Value
0	ID (identifier)	Mandatory DS identifier	None	0	
1	UUID	UUID assigned to prototype	None	0	
2	NSPC	Prototype namespace	None	0	
3	Name	Prototype name	None	0	
4	DAEL	Data Element			

3.11. DATA SET DESCRIPTOR CONTENTS AND CHARACTERISTICS
Object Number: 86
Variation Numbers: 1 and 2

	Capabilities	Current Value	If configurable list methods
3.11.1. Definition of Data Set Descriptors:	<input type="checkbox"/> Fixed, a Data Set Descriptor is shown in table below <input type="checkbox"/> Configurable (current list		

		may be shown in table below) <input type="checkbox"/> Other, explain:			
3.11.2. Description:		.			.
3.11.3. Data Set Properties:		<input type="checkbox"/> Readable <input type="checkbox"/> Writable <input type="checkbox"/> Outstation maintains a static data set <input type="checkbox"/> Outstation generates a data set event <input type="checkbox"/> Data set defined by master			.
3.11.4. Default Event Assigned Class:		<input type="checkbox"/> One <input type="checkbox"/> Two <input type="checkbox"/> Three			.
3.11.5. Static Data Set included in Class 0 response:		<input type="checkbox"/> Always <input type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point index			.
Element Number	Descriptor Code	Element Description	Data Type Code	Max Data Length	Ancillary Value
0	ID (identifier)	Mandatory DS identifier	None	0	
Data set Points					
Element Number	DNP Group Number	Point Index			

4. Implementation Table

The following implementation table identifies which object groups and variations, function codes and qualifiers the device supports in both requests and responses. The *Request* columns identify all requests that may be sent by a Master, or all requests that must be parsed by an Outstation. The *Response* columns identify all responses that must be parsed by a Master, or all responses that may be sent by an Outstation.

DNP OBJECT GROUP & VARIATION		REQUEST Master may issue Outstation must parse	RESPONSE Master must parse Outstation may issue
	Description		

Object Group Number	Variation Number		Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input - any variation	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
1	0	Binary Input - any variation	22(<i>assign class</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
1	1	Binary Input - Single-bit packed	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
1	2	Binary Input - Single-bit with flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
2	0	Binary Input Change Event - any variation	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
2	1	Binary Input Change Event - without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
2	1	Binary Input Change Event - without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
2	2	Binary Input Change Event - with absolute time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
2	2	Binary Input Change Event - with absolute time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)

2	3	Binary Input Change Event - with relative time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
2	3	Binary Input Change Event - with relative time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
3	0	Double-bit Input - any variation	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
3	0	Double-bit Input - any variation	22(<i>assign class</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
3	1	Double-bit Input - Double-bit packed	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
3	2	Double-bit Input - with flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
4	0	Double-bit Input Change Event - any variation	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
4	1	Double-bit Input Change Event - without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
4	1	Double-bit Input Change Event - without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
4	2	Double-bit Input Change Event - with absolute time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08	129 (<i>Response</i>)	17, 28 (<i>index</i>)

				(limited qty)		
4	2	Double-bit Input Change Event - with absolute time	1(read)	06 (no range, or all), 07, 08 (limited qty)	130 (Unsol. Resp.)	17, 28 (index)
4	3	Double-bit Input Change Event - with relative time	1(read)	06 (no range, or all), 07, 08 (limited qty)	129 (Response)	17, 28 (index)
4	3	Double-bit Input Change Event - with relative time	1(read)	06 (no range, or all), 07, 08 (limited qty)	130 (Unsol. Resp.)	17, 28 (index)
10	0	Continuous Control - any variation	1(read)	00, 01 (start-stop), 06 (no range, or all)	-	-
10	0	Continuous Control - any variation	22(assign class)	00, 01 (start-stop), 06 (no range, or all)	-	-
10	2	Continuous Control - binary output status	1(read)	00, 01 (start-stop), 06 (no range, or all)	129 (Response)	00, 01 (start-stop)
11	0	Binary Output Change Event - any variation	-	-	-	-
11	1	Binary Output Change Event - status without time	-	-	-	-
11	1	Binary Output Change Event - status without time	-	-	-	-
11	2	Binary Output Change Event - status with time	-	-	-	-
11	2	Binary Output Change Event - status with time	-	-	-	-
12	0	Pulsed Control - any variation	22(assign class)	00, 01 (start-stop)	-	-
12	1	Pulsed Control - control relay output block	3(select)	17, 28 (index)	129 (Response)	17, 28 (index)
12	1	Pulsed Control - control relay output block	4(operate)	17, 28 (index)	129 (Response)	17, 28 (index)

12	1	Pulsed Control - control relay output block	5(<i>direct op.</i>)	17, 28 (<i>index</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
12	1	Pulsed Control - control relay output block	6(<i>direct op, no ack</i>)	17, 28 (<i>index</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
12	2	Pulsed Control - pattern control block	5(<i>direct op.</i>)	07 (<i>limited qty = 1</i>)	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
12	2	Pulsed Control - pattern control block	6(<i>direct op, no ack</i>)	07 (<i>limited qty = 1</i>)	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
12	3	Pulsed Control - pattern mask	5(<i>direct op.</i>)	00, 01 (<i>start-stop</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
12	3	Pulsed Control - pattern mask	6(<i>direct op, no ack</i>)	00, 01 (<i>start-stop</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
13	0	Binary Output Command Event - any variation	-	-	-	-
13	1	Binary Output Command Event - without time	-	-	-	-
13	1	Binary Output Command Event - without time	-	-	-	-
13	2	Binary Output Command Event - with time	-	-	-	-
13	2	Binary Output Command Event - with time	-	-	-	-
20	0	Counter - any variation	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
20	0	Counter - any variation	22(<i>assign class</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	-	-
20	1	Counter - 32-bit with flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
20	2	Counter - 16-bit with flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
20	5	Counter - 32-bit without flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
20	6	Counter - 16-bit without flag	1(<i>read</i>)			

				00, 01 <i>(start-stop),</i> 06 <i>(no range, or all)</i>	129 <i>(Response)</i>	00, 01 <i>(start-stop)</i>
21	0	Frozen Counter - any variation	-	-	-	-
21	0	Frozen Counter - any variation	-	-	-	-
21	1	Frozen Counter - 32-bit with flag	-	-	-	-
21	2	Frozen Counter - 16-bit with flag	-	-	-	-
21	5	Frozen Counter - 32-bit with flag and time	-	-	-	-
21	6	Frozen Counter - 16-bit with flag and time	-	-	-	-
21	9	Frozen Counter - 32-bit without flag	-	-	-	-
21	10	Frozen Counter - 16-bit without flag	-	-	-	-
22	0	Counter Change Event - any variation	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08 <i>(limited qty)</i>	-	-
22	1	Counter Change Event - 32-bit with flag	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08 <i>(limited qty)</i>	129 <i>(Response)</i>	17, 28 <i>(index)</i>
22	1	Counter Change Event - 32-bit with flag	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08 <i>(limited qty)</i>	130 <i>(Unsol. Resp.)</i>	17, 28 <i>(index)</i>
22	2	Counter Change Event - 16-bit with flag	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08 <i>(limited qty)</i>	129 <i>(Response)</i>	17, 28 <i>(index)</i>
22	2	Counter Change Event - 16-bit with flag	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08 <i>(limited qty)</i>	130 <i>(Unsol. Resp.)</i>	17, 28 <i>(index)</i>
22	5	Counter Change Event - 32-bit with flag and time	1 <i>(read)</i>	06 <i>(no range, or all),</i> 07, 08	129 <i>(Response)</i>	17, 28 <i>(index)</i>

				<i>(limited qty)</i>		
22	5	Counter Change Event - 32-bit with flag and time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 <i>(limited qty)</i>	130 <i>(Unsol. Resp.)</i>	17, 28 <i>(index)</i>
22	6	Counter Change Event - 16-bit with flag and time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 <i>(limited qty)</i>	129 <i>(Response)</i>	17, 28 <i>(index)</i>
22	6	Counter Change Event - 16-bit with flag and time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 <i>(limited qty)</i>	130 <i>(Unsol. Resp.)</i>	17, 28 <i>(index)</i>
23	0	Frozen Counter Change Event - any variation	-	-	-	-
23	1	Frozen Counter Change Event - 32-bit with flag	-	-	-	-
23	1	Frozen Counter Change Event - 32-bit with flag	-	-	-	-
23	2	Frozen Counter Change Event - 16-bit with flag	-	-	-	-
23	2	Frozen Counter Change Event - 16-bit with flag	-	-	-	-
23	5	Frozen Counter Change Event - 32-bit with flag and time	-	-	-	-
23	5	Frozen Counter Change Event - 32-bit with flag and time	-	-	-	-
23	6	Frozen Counter Change Event - 16-bit with flag and time	-	-	-	-
23	6	Frozen Counter Change Event - 16-bit with flag and time	-	-	-	-
30	0	Analog Input - any variation	1(<i>read</i>)	00, 01 <i>(start-stop)</i> , 06 (<i>no range, or all</i>)	-	-
30	0	Analog Input - any variation	22(<i>assign class</i>)	00, 01 <i>(start-stop)</i> , 06 (<i>no range, or all</i>)	-	-
30	1	Analog Input - 32-bit with flag	1(<i>read</i>)	00, 01 <i>(start-stop)</i> , 06 (<i>no</i>	129 <i>(Response)</i>	00, 01 <i>(start-stop)</i>

				<i>range, or all)</i>		
30	2	Analog Input - 16-bit with flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
30	3	Analog Input - 32-bit without flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
30	4	Analog Input - 16-bit without flag	1(<i>read</i>)	00, 01 (<i>start-stop</i>), 06 (<i>no range, or all</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
30	5	Analog Input - single-precision, floating-point with flag	-	-	-	-
30	6	Analog Input - double-precision, floating-point with flag	-	-	-	-
31	0	Frozen Analog Input - any variation	-	-	-	-
31	0	Frozen Analog Input - any variation	-	-	-	-
31	1	Frozen Analog Input - 32-bit with flag	-	-	-	-
31	2	Frozen Analog Input - 16-bit with flag	-	-	-	-
31	3	Frozen Analog Input - 32-bit with time of freeze	-	-	-	-
31	4	Frozen Analog Input - 16-bit with time of freeze	-	-	-	-
31	5	Frozen Analog Input - 32-bit without flag	-	-	-	-
31	6	Frozen Analog Input - 16-bit without flag	-	-	-	-
31	7	Frozen Analog Input - single-precision, floating point with flag	-	-	-	-
31	8	Frozen Analog Input - double-precision, floating point with flag	-	-	-	-
32	0	Analog Input Change Event - any variation	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	-	-

32	1	Analog Input Change Event - 32-bit without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
32	1	Analog Input Change Event - 32-bit without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
32	2	Analog Input Change Event - 16-bit without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
32	2	Analog Input Change Event - 16-bit without time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
32	3	Analog Input Change Event - 32-bit with time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
32	3	Analog Input Change Event - 32-bit with time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
32	4	Analog Input Change Event - 16-bit with time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	129 (<i>Response</i>)	17, 28 (<i>index</i>)
32	4	Analog Input Change Event - 16-bit with time	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	130 (<i>Unsol. Resp.</i>)	17, 28 (<i>index</i>)
32	5	Analog Input Change Event - single-precision, floating-point without time	-	-	-	-
32	5	Analog Input Change Event - single-precision, floating-point without time	-	-	-	-
32	6		-	-	-	-

		Analog Input Change Event - double-precision, floating-point without time				
32	6	Analog Input Change Event - double-precision, floating-point without time	-	-	-	-
32	7	Analog Input Change Event - single-precision, floating-point with time	-	-	-	-
32	7	Analog Input Change Event - single-precision, floating-point with time	-	-	-	-
32	8	Analog Input Change Event - double-precision, floating-point with time	-	-	-	-
32	8	Analog Input Change Event - double-precision, floating-point with time	-	-	-	-
33	0	Frozen Analog Input Change Event - any variation	-	-	-	-
33	1	Frozen Analog Input Change Event - 32-bit without time	-	-	-	-
33	1	Frozen Analog Input Change Event - 32-bit without time	-	-	-	-
33	2	Frozen Analog Input Change Event - 16-bit without time	-	-	-	-
33	2	Frozen Analog Input Change Event - 16-bit without time	-	-	-	-
33	3	Frozen Analog Input Change Event - 32-bit with time	-	-	-	-
33	3	Frozen Analog Input Change Event - 32-bit with time	-	-	-	-
33	4	Frozen Analog Input Change Event - 16-bit with time	-	-	-	-
33	4	Frozen Analog Input Change Event - 16-bit with time	-	-	-	-
33	5	Frozen Analog Input Change Event - single-precision, floating-point without time	-	-	-	-
33	5	Frozen Analog Input Change Event - single-precision, floating-point without time	-	-	-	-
33	6	Frozen Analog Input Change Event - double-precision, floating-point without time	-	-	-	-
33	6	Frozen Analog Input Change Event - double-precision, floating-point without time	-	-	-	-
33	7		-	-	-	-

		Frozen Analog Input Change Event - single-precision, floating-point with time				
33	7	Frozen Analog Input Change Event - single-precision, floating-point with time	-	-	-	-
33	8	Frozen Analog Input Change Event - double-precision, floating-point with time	-	-	-	-
33	8	Frozen Analog Input Change Event - double-precision, floating-point with time	-	-	-	-
34	0	Analog Input Deadband - any variation	-	-	-	-
34	1	Analog Input Deadband - 16-bit	-	-	-	-
34	1	Analog Input Deadband - 16-bit	-	-	-	-
34	2	Analog Input Deadband - 32-bit	-	-	-	-
34	2	Analog Input Deadband - 32-bit	-	-	-	-
34	3	Analog Input Deadband - single-precision, floating-point	-	-	-	-
34	3	Analog Input Deadband - single-precision, floating-point	-	-	-	-
40	0	Analog Output Status - any variation	-	-	-	-
40	0	Analog Output Status - any variation	-	-	-	-
40	1	Analog Output Status - 32-bit with flag	-	-	-	-
40	2	Analog Output Status - 16-bit with flag	-	-	-	-
40	3	Analog Output Status - single-precision, floating-point with flag	-	-	-	-
40	4	Analog Output Status - double-precision, floating-point with flag	-	-	-	-
41	0	Analog Output Block - any variation	-	-	-	-
41	1	Analog Output Block - 32-bit	-	-	-	-
41	1	Analog Output Block - 32-bit	-	-	-	-
41	1	Analog Output Block - 32-bit	-	-	-	-
41	1	Analog Output Block - 32-bit	-	-	-	-
41	2	Analog Output Block - 16-bit	-	-	-	-
41	2	Analog Output Block - 16-bit	-	-	-	-
41	2	Analog Output Block - 16-bit	-	-	-	-
41	2	Analog Output Block - 16-bit	-	-	-	-

41	3	Analog Output Block - single-precision, floating-pointt	-	-	-	-
41	3	Analog Output Block - single-precision, floating-pointt	-	-	-	-
41	3	Analog Output Block - single-precision, floating-pointt	-	-	-	-
41	3	Analog Output Block - single-precision, floating-pointt	-	-	-	-
41	4	Analog Output Block - double-precision, floating-point	-	-	-	-
41	4	Analog Output Block - double-precision, floating-point	-	-	-	-
41	4	Analog Output Block - double-precision, floating-point	-	-	-	-
41	4	Analog Output Block - double-precision, floating-point	-	-	-	-
42	0	Analog Output Change Event - any variation	-	-	-	-
42	1	Analog Output Change Event - 32-bit without time	-	-	-	-
42	1	Analog Output Change Event - 32-bit without time	-	-	-	-
42	2	Analog Output Change Event - 16-bit without time	-	-	-	-
42	2	Analog Output Change Event - 16-bit without time	-	-	-	-
42	3	Analog Output Change Event - 32-bit with time	-	-	-	-
42	3	Analog Output Change Event - 32-bit with time	-	-	-	-
42	4	Analog Output Change Event - 16-bit with time	-	-	-	-
42	4	Analog Output Change Event - 16-bit with time	-	-	-	-
42	5	Analog Output Change Event - single-precision, floating-point without time	-	-	-	-
42	5	Analog Output Change Event - single-precision, floating-point without time	-	-	-	-
42	6	Analog Output Change Event - double-precision, floating-point without time	-	-	-	-
42	6	Analog Output Change Event - double-precision, floating-point without time	-	-	-	-
42	7		-	-	-	-

		Analog Output Change Event - single-precision, floating-point with time				
42	7	Analog Output Change Event - single-precision, floating-point with time	-	-	-	-
42	8	Analog Output Change Event - double-precision, floating-point with time	-	-	-	-
42	8	Analog Output Change Event - double-precision, floating-point with time	-	-	-	-
43	0	Analog Output Command Event - any variation	-	-	-	-
43	1	Analog Output Command Event - 32-bit without time	-	-	-	-
43	1	Analog Output Command Event - 32-bit without time	-	-	-	-
43	2	Analog Output Command Event - 16-bit without time	-	-	-	-
43	2	Analog Output Command Event - 16-bit without time	-	-	-	-
43	3	Analog Output Command Event - 32-bit with time	-	-	-	-
43	3	Analog Output Command Event - 32-bit with time	-	-	-	-
43	4	Analog Output Command Event - 16-bit with time	-	-	-	-
43	4	Analog Output Command Event - 16-bit with time	-	-	-	-
43	5	Analog Output Command Event - single-precision, floating-point without time	-	-	-	-
43	5	Analog Output Command Event - single-precision, floating-point without time	-	-	-	-
43	6	Analog Output Command Event - double-precision, floating-point without time	-	-	-	-
43	6	Analog Output Command Event - double-precision, floating-point without time	-	-	-	-
43	7	Analog Output Command Event - single-precision, floating-point with time	-	-	-	-
43	7	Analog Output Command Event - single-precision, floating-point with time	-	-	-	-
43	8		-	-	-	-

		Analog Output Command Event - double-precision, floating-point with time				
43	8	Analog Output Command Event - double-precision, floating-point with time	-	-	-	-
50	1	Time and Date - absolute time	1(<i>read</i>)	07 (<i>limited qty = 1</i>)	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
50	1	Time and Date - absolute time	2(<i>write</i>)	07 (<i>limited qty = 1</i>)	-	-
50	2	Time and Date - absolute time and interval	11(<i>frz at time</i>)	07 (<i>limited qty = 1</i>)	-	-
50	2	Time and Date - absolute time and interval	12(<i>frz at time, no ack</i>)	07 (<i>limited qty = 1</i>)	-	-
50	3	Time and Date - absolute time at last recorded time	2(<i>write</i>)	07 (<i>limited qty = 1</i>)	-	-
51	1	Time and Date CTO - absolute time, synchronised	-	-	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
51	1	Time and Date CTO - absolute time, synchronised	-	-	130 (<i>Unsol. Resp.</i>)	07 (<i>limited qty = 1</i>)
51	2	Time and Date CTO - absolute time, un-synchronised	-	-	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
51	2	Time and Date CTO - absolute time, un-synchronised	-	-	130 (<i>Unsol. Resp.</i>)	07 (<i>limited qty = 1</i>)
52	1	Time Delay - coarse	-	-	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
52	2	Time Delay - fine	-	-	129 (<i>Response</i>)	07 (<i>limited qty = 1</i>)
60	1	Class Objects - class 0 data	1(<i>read</i>)	06 (<i>no range, or all</i>)	-	-
60	2	Class Objects - class 1 data	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08 (<i>limited qty</i>)	-	-
60	2	Class Objects - class 1 data	20(<i>enable unsol.</i>)	06 (<i>no range, or all</i>)	-	-
60	2	Class Objects - class 1 data	21(<i>disable unsol.</i>)	06 (<i>no range, or all</i>)	-	-
60	2	Class Objects - class 1 data	22(<i>assign class</i>)	06 (<i>no range, or all</i>)	-	-
60	3	Class Objects - class 2 data	1(<i>read</i>)	06 (<i>no range, or all</i>), 07, 08	-	-

				(limited qty)		
60	3	Class Objects - class 2 data	20(enable unsol.)	06 (no range, or all)	-	-
60	3	Class Objects - class 2 data	21(disable unsol.)	06 (no range, or all)	-	-
60	3	Class Objects - class 2 data	22(assign class)	06 (no range, or all)	-	-
60	4	Class Objects - class 3 data	1(read)	06 (no range, or all), 07, 08 (limited qty)	-	-
60	4	Class Objects - class 3 data	20(enable unsol.)	06 (no range, or all)	-	-
60	4	Class Objects - class 3 data	21(disable unsol.)	06 (no range, or all)	-	-
60	4	Class Objects - class 3 data	22(assign class)	06 (no range, or all)	-	-
70	0	File Control - any variation	-	-	-	-
70	0	File Control - any variation	-	-	-	-
70	2	File Control - authentication	-	-	-	-
70	3	File Control - file command	-	-	-	-
70	3	File Control - file command	-	-	-	-
70	4	File Control - file command status	-	-	-	-
70	4	File Control - file command status	-	-	-	-
70	4	File Control - file command status	-	-	-	-
70	4	File Control - file command status	-	-	-	-
70	5	File Control - file transport	-	-	-	-
70	5	File Control - file transport	-	-	-	-
70	5	File Control - file transport	-	-	-	-
70	5	File Control - file transport	-	-	-	-
70	6	File Control - file transport status	-	-	-	-
70	6	File Control - file transport status	-	-	-	-
70	7	File Control - file descriptor	-	-	-	-
70	7	File Control - file descriptor	-	-	-	-
70	8		-	-	-	-

		File Control - file specification string				
80	1	Internal Indications - packed format	1(<i>read</i>)	00, 01 (<i>start-stop</i>)	129 (<i>Response</i>)	00, 01 (<i>start-stop</i>)
80	1	Internal Indications - packed format	2(<i>write</i>)	00 (<i>start-stop</i>)	-	-
85	0	Data Set Prototype - any variation	-	-	-	-
85	1	Data Set Prototype - with UUID	-	-	-	-
85	1	Data Set Prototype - with UUID	-	-	-	-
86	0	Data Set Descriptor - any variation	-	-	-	-
86	0	Data Set Descriptor - any variation	-	-	-	-
86	1	Data Set Descriptor - Data Set contents	-	-	-	-
86	1	Data Set Descriptor - Data Set contents	-	-	-	-
86	2	Data Set Descriptor - characteristics	-	-	-	-
86	3	Data Set Descriptor - point index attributes	-	-	-	-
86	3	Data Set Descriptor - point index attributes	-	-	-	-
87	1	Data Set - present value	-	-	-	-
87	1	Data Set - present value	-	-	-	-
88	0	Data Set Event - any variation	-	-	-	-
88	1	Data Set Event - snapshot	-	-	-	-
88	1	Data Set Event - snapshot	-	-	-	-
91	1	Status of Requested Operation	-	-	-	-
101	1	Binary Coded Decimal Integers - small	-	-	-	-
101	2	Binary Coded Decimal Integers - medium	-	-	-	-
101	3	Binary Coded Decimal Integers - large	-	-	-	-
110	255	Octet String	-	-	-	-
110	255	Octet String	-	-	-	-
111	255	Octet String Change Event	-	-	-	-
111	255	Octet String Change Event	-	-	-	-
112	255	Virtual Terminal Output Block	-	-	-	-
113	255	Virtual Terminal Event Data	-	-	-	-
113	255	Virtual Terminal Event Data	-	-	-	-

----- End of Device Profile for Reference Device -----

----- End of Complete Device Profile -----