

**DNP3  
Device Profile Document  
For  
C&D Technologies  
ARE-M Series  
Float Chargers  
Single-Phase Input**

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# Issue History

<b>Date</b>	<b>Issue</b>	<b>Reason for change</b>	<b>Edited by</b>
8/20/07	1.00	Initial Release, See ECN#16027	JKK
12/19/07	1.01	Update point & IP networking. See ECN#16138	JKK
2/22/08	2	Update Implementation Table, and defaults. See ECN#16139	JKK
02/10/10	3	Updated default IP address and default gateway address. ECN17172	CJM
07/20/10	4	Updated SUM alarms, added VLVA and HBTA. ECN17333	LP

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# 1 DEVICE PROPERTIES

Unless otherwise noted, multiple boxes in the second column below should be 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 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 methods 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, the third column should be filled in even if a fixed parameter is selected in the capabilities section (“NA” may be entered for parameters that are Not Applicable).

If this document is used to show the current value of each parameter, the “Current Value” column applies to a single connection between a master and outstation. If the device has multiple or backup connections to other DNP devices that you wish to show in the Device Profile Document, see section 8.3.2 “Reference Device and Auxiliary Info” of Volume 8 Interoperability or duplicate the entire Device Profile Document for each communication link to a logical or physical DNP3 Device.

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>	<p><input type="radio"/> Master</p> <p><input checked="" type="checkbox"/> Outstation</p>	<p><input type="radio"/> Master</p> <p><input checked="" type="checkbox"/> Outstation</p>	
<p>1.1.2 Vendor Name:</p> <p><i>The name of the organization producing the device.</i></p>		C&D Technologies	
<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>		ARE-M	
<p>1.1.4 Device manufacturer's hardware version string:</p>			
<p>1.1.5 Device manufacturer's software version string:</p>			
<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 the beginning of this document.</i></p>		4	

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods
<p>1.1.7 DNP Levels Supported for:</p> <p><i>Indicate each DNP3 Level to which the device conforms fully. For Masters, requests and responses can be indicated independently.</i></p>	<p>Masters Only</p> <p>Requests    Responses</p> <p><input type="checkbox"/> ..... <input type="checkbox"/> ..... None</p> <p><input type="checkbox"/> ..... <input type="checkbox"/> ..... Level 1</p> <p><input type="checkbox"/> ..... <input type="checkbox"/> ..... Level 2</p> <p><input type="checkbox"/> ..... <input type="checkbox"/> ..... Level 3</p> <p>Outstations Only</p> <p>Requests and Responses</p> <p><input type="checkbox"/> ..... None</p> <p><input type="checkbox"/> ..... Level 1</p> <p><input checked="" type="checkbox"/> ..... Level 2</p> <p><input type="checkbox"/> ..... Level 3</p>		
<p>1.1.8 Supported Function Blocks:</p> <p>.</p>	<p><input checked="" type="checkbox"/> Self-Address Reservation</p> <p><input type="checkbox"/> Object 0 – attribute objects</p> <p><input type="checkbox"/> Data Sets</p> <p><input type="checkbox"/> File Transfer</p> <p><input type="checkbox"/> Virtual Terminal</p> <p><input type="checkbox"/> Mapping to IEC 61850 Object Models defined in a DNP3 XML file</p>		
<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>			

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods																				
<p>1.1.10 Methods to set Configurable Parameters:</p>	<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 type="checkbox"/> Software – Vendor software named _____ <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 checked="" type="checkbox"/> Other – explain <u>Web Browser</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> <p>.</p>	<table border="1"> <thead> <tr> <th>Rd</th> <th>Wr</th> <th>Filename</th> <th>Description of Contents</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td></td> <td>dnpDP.xml</td> <td>Complete Device Profile</td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td>dnpDPcap.xml</td> <td>Device Profile Capabilities</td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td>dnpDPcfg.xml</td> <td>Device Profile config. values</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>_____*.xml</td> <td>_____</td> </tr> </tbody> </table> <p>* The Complete Device Profile Document contains the capabilities, Current Value, and configurable methods columns.            * The Device Profile Capabilities contains only the capabilities and configurable methods columns.            * The Device Profile Config. Values contains only the Current Value column.</p>	Rd	Wr	Filename	Description of Contents	<input type="checkbox"/>		dnpDP.xml	Complete Device Profile	<input type="checkbox"/>		dnpDPcap.xml	Device Profile Capabilities	<input type="checkbox"/>		dnpDPcfg.xml	Device Profile config. values	<input type="checkbox"/>	<input type="checkbox"/>	_____*.xml	_____		
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<input type="checkbox"/>	<input type="checkbox"/>	_____*.xml	_____																				

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods																				
<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="1"> <thead> <tr> <th>Rd</th> <th>Wr</th> <th>Filename</th> <th>Description of Contents</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDP.xml</td> <td>Complete Device Profile</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPcap.xml</td> <td>Device Profile Capabilities</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>dnpDPcfg.xml</td> <td>Device Profile config. values</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>_____*.xml</td> <td>_____</td> </tr> </tbody> </table> <p>* The Complete Device Profile Document contains the capabilities, Current Value, and configurable methods columns.</p> <p>* The Device Profile Capabilities contains only the capabilities and configurable methods columns.</p> <p>* The Device Profile Config. Values contains only the Current Value column.</p>	Rd	Wr	Filename	Description of Contents	<input type="checkbox"/>	<input type="checkbox"/>	dnpDP.xml	Complete Device Profile	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPcap.xml	Device Profile Capabilities	<input type="checkbox"/>	<input type="checkbox"/>	dnpDPcfg.xml	Device Profile config. values	<input type="checkbox"/>	<input type="checkbox"/>	_____*.xml	_____		
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<input type="checkbox"/>	<input type="checkbox"/>	_____*.xml	_____																				
<p>1.1.13 Connections Supported:</p>	<p><input 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>																						

1.2 SERIAL CONNECTIONS	Capabilities	Current Value	If configurable, list methods
1.2.1 Port Name <i>Name used to reference the communication port defined in this section.</i>			
1.2.2 Serial Connection Parameters:	<input type="checkbox"/> Asynchronous - 8 Data Bits, 1 Start Bit, 1 Stop Bit, No Parity <input type="checkbox"/> Other, explain _____		
1.2.3 Baud Rate:	<input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		

1.2 SERIAL CONNECTIONS	Capabilities	Current Value	If configurable, list methods
<p>1.2.4 Hardware Flow Control (Handshaking):</p> <p><i>Describe hardware signaling requirements of the interface.</i></p> <p><i>Where a transmitter or receiver is inhibited until a given control signal is asserted, it is considered to require that signal prior to sending or receiving characters.</i></p> <p><i>Where a signal is asserted prior to transmitting, that signal will be maintained active until after the end of transmission.</i></p> <p><i>Where a signal is asserted to enable reception, any data sent to the device when the signal is not active could be discarded.</i></p>	<p><input type="checkbox"/> None</p> <p><b>RS-232 / V.24 / V.28 Options:</b></p> <p>Before Tx, Asserts: <input type="checkbox"/> RTS  <input type="checkbox"/> DTR</p> <p>Before Rx, Asserts: <input type="checkbox"/> RTS  <input type="checkbox"/> DTR</p> <p>Always Asserts: <input type="checkbox"/> RTS  <input type="checkbox"/> DTR</p> <p>Before Tx, Requires: AssertedDeasserted  <input type="checkbox"/> CTS  <input type="checkbox"/> DCD  <input type="checkbox"/> DSR  <input type="checkbox"/> RI  <input type="checkbox"/> Rx Inactive</p> <p>Before Rx, Requires: AssertedDeasserted  <input type="checkbox"/> CTS  <input type="checkbox"/> DCD  <input type="checkbox"/> DSR  <input type="checkbox"/> RI</p> <p>Always Ignores:  <input type="checkbox"/> CTS  <input type="checkbox"/> DCD  <input type="checkbox"/> DSR  <input type="checkbox"/> RI</p> <p><input type="checkbox"/> Other, explain _____</p> <p><b>RS-422 / V.11 Options:</b></p> <p><input type="checkbox"/> Requires Indication before Rx  <input type="checkbox"/> Asserts Control before Tx  <input type="checkbox"/> Other, explain _____</p> <p><b>RS-485 Options:</b></p> <p><input type="checkbox"/> Requires Rx inactive before Tx  <input type="checkbox"/> Other, explain _____</p>		

1.2 SERIAL CONNECTIONS	Capabilities	Current Value	If configurable, list methods
<p>1.2.5 Interval to Request Link Status:</p> <p><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></p>	<input type="checkbox"/> Not Supported <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 _____		
<p>1.2.6 Supports DNP3 Collision Avoidance:</p> <p><i>Indicates whether a device uses a collision avoidance algorithm. Documentation by the vendor will provide information on collision avoidance schemes.</i></p>	<input type="checkbox"/> No <input type="checkbox"/> Yes, explain _____		
<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. extension 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 to not 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 shall be selected.</i></p>	<input type="checkbox"/> Not checked <input type="checkbox"/> No gap permitted <input type="checkbox"/> Fixed at _____ bit times <input type="checkbox"/> Fixed at _____ ms <input type="checkbox"/> Configurable, range _____ to _____ bit times <input type="checkbox"/> Configurable, range _____ to _____ ms <input type="checkbox"/> Configurable, Selectable from ____, ____, ____ bit times <input type="checkbox"/> Configurable, Selectable from ____, ____, ____ ms <input type="checkbox"/> Configurable, other, describe _____ <input type="checkbox"/> Variable, explain _____		

1.2 SERIAL CONNECTIONS	Capabilities	Current Value	If configurable, list methods
<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 shall be selected.</i></p>	<p><input type="checkbox"/> None (always transmits with no inter-character gap)</p> <p><input type="checkbox"/> Maximum _____ bit times</p> <p><input type="checkbox"/> Maximum _____ ms</p>		

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.1 Port Name <i>Name used to reference the communication port defined in this section.</i>	Ethernet Port	Ethernet Port	
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)		DHCP/Keypad
1.3.3 IP Address of this Device:		192.168.10.73	DHCP/Keypad / Web
1.3.4 Subnet Mask:		255.255.255.0	DHCP/Keypad / Web
1.3.5 Gateway IP Address:		192.168.10.1	DHCP/Keypad / Web
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 an 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 _____		
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 Master, 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 checked="" type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
<p>1.3.9 TCP Listen Port Number of remote device:</p> <p><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></p>	<input type="checkbox"/> Not Applicable (Outstation w/o dual end point) <input checked="" type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		
<p>1.3.10 TCP Keep-alive timer:</p> <p><i>The time period for the keep-alive timer on active TCP connections.</i></p>	<input checked="" type="checkbox"/> Fixed at <u>55000</u> ms <input type="checkbox"/> Configurable, range _____ to _____ ms <input type="checkbox"/> Configurable, selectable from _____, _____, _____ ms <input type="checkbox"/> Configurable, other, describe _____		
<p>1.3.11 Local UDP port:</p> <p><i>Local UDP port for sending and/or receiving UDP datagrams. Master may let system choose an available port. Outstation must use one that is known by the master.</i></p>	<input checked="" type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____ <input type="checkbox"/> Let system choose (Master only)		
<p>1.3.12 Destination UDP port for DNP3 Requests (Master Only):</p>			
<p>1.3.13 Destination UDP port for initial unsolicited null responses (UDP only Outstations):</p> <p><i>For a UDP only Outstation, the destination UDP port for sending initial unsolicited Null response</i></p>	<input type="checkbox"/> None <input checked="" type="checkbox"/> Fixed at 20,000 <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		
<p>1.3.14 Destination UDP port for responses:</p> <p><i>For a UDP only Outstation, the destination UDP port for sending all responses other than initial unsolicited Null Response.</i></p>	<input type="checkbox"/> None <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 _____ <input checked="" type="checkbox"/> Use source port number		

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.15 Multiple outstation connections (Masters only): <i>Master only. Indicates whether multiple outstation connections are supported.</i>	<input type="checkbox"/> Supports multiple outstations (Masters only)		
1.3.16 Multiple master connections (Outstations Only): <i>Outstation only. Indicates whether multiple master connections are supported and the method that can be used to establish connections.</i>	<input type="checkbox"/> Supports multiple masters (Outstations only)  If supported, the following methods may be used: <input type="checkbox"/> Method 1 (based on IP address) - required <input type="checkbox"/> Method 2 (based on IP port number) - recommended <input type="checkbox"/> Method 3 (browsing for static data) - optional		
1.3.17 Time synchronization support:	<input checked="" type="checkbox"/> DNP3 LAN procedure (function code 24) <input checked="" type="checkbox"/> DNP3 Write Time (not recommended over LAN) <input type="checkbox"/> Other, explain _____ <input type="checkbox"/> Not Supported		

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 0xFFFF0 through 0xFFFFF are reserved for broadcast or other special purposes.</i></p>	<p><input type="checkbox"/> Fixed at _____</p> <p><input checked="" type="checkbox"/> Configurable, range <u>  0  </u> to <u>65,519</u></p> <p><input type="checkbox"/> Configurable, selectable from _____, _____, _____</p> <p><input type="checkbox"/> Configurable, other, describe _____</p>	4	Front Panel
<p>1.4.2 DNP3 Source Address Validation:</p> <p><i>Indicates whether the device will filter out messages not from a specific source address.</i></p>	<p><input checked="" type="checkbox"/> Never</p> <p><input 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>		
<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 type="checkbox"/> Configurable to any 16 bit DNP Data Link Address value</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>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 disable the feature if supported.</i></p>	<p><input checked="" type="checkbox"/> Yes (only allowed if configurable)</p> <p><input type="checkbox"/> No</p>	Enabled	Front Panel
<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"/> Always</p> <p><input checked="" type="checkbox"/> Sometimes, explain <u>  If requested by master  </u></p> <p><input type="checkbox"/> Never</p>		

1.4 LINK LAYER	Capabilities	Current Value	If configurable, list methods
<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>	<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>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>	<input checked="" type="checkbox"/> Never Retries <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____,_____,_____ms <input type="checkbox"/> Configurable, other, describe _____		
<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>	<input checked="" type="checkbox"/> Fixed at <u>292</u> <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____,_____,_____ms <input type="checkbox"/> Configurable, other, describe _____	292	
<p>1.4.9 Maximum number of octets that can be Received 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. The device must be able to receive 292 octets to be compliant.</i></p>	<input checked="" type="checkbox"/> Fixed at <u>292</u> <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____,_____,_____ms <input type="checkbox"/> Configurable, other, describe _____	292	

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.</i></p> <ul style="list-style-type: none"> <li>•Masters must provide a setting less than or equal to 249.</li> <li>•Outstations must provide a setting less than or equal to 2048.</li> </ul>	<input checked="" type="checkbox"/> Fixed at <u>249</u> <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____	249	
<p>1.5.2 Maximum number of octets Transmitted in an Application Layer Fragment containing File Transfer:</p>	<input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		
<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.</i></p> <ul style="list-style-type: none"> <li>•Masters must provide a setting greater than or equal to 2048.</li> <li>•Outstations must provide a setting greater than or equal to 249.</li> </ul>	<input checked="" type="checkbox"/> Fixed at <u>249</u> <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____	249	
<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>	<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 _____		

1.5 APPLICATION LAYER	Capabilities	Current Value	If configurable, list methods
1.5.5 Maximum number of objects allowed in a single control request for CROB (group 12):	<input checked="" type="checkbox"/> Fixed at <u>16</u> (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 _____	16	
1.5.6 Maximum number of objects allowed in a single control request for Analog Outputs (group 41):	<input checked="" type="checkbox"/> Fixed at <u>16</u> (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 _____	16	
1.5.7 Maximum number of objects allowed in a single control request for Data Sets (groups 85,86,87):	<input checked="" type="checkbox"/> Fixed at <u>0</u> (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 _____	0	
1.5.8 Supports mixing object groups (AOBs, CROBs and Data Sets) in the same control request:	<input type="checkbox"/> Not applicable – controls are not supported <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
<p>1.6.1 Timeout waiting for Complete Application Layer Response(ms):</p> <p><i>Timeout on Master if all fragments of a response message are not received in the specified time.</i></p>	<input 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>1.6.2 Maximum Application Layer Retries for Request Messages:</p> <p><i>The number of times a Master will retransmit an application layer request message if a response is not received. This parameter must never cause a Master to retransmit control or time sync messages. Outstations should never transmit retries.</i></p>	<input type="checkbox"/> None (required) <input type="checkbox"/> Fixed at _____ <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from ____, ____, ____ <input type="checkbox"/> Configurable, other, describe _____ <input type="checkbox"/> Variable, explain _____		
<p>1.6.3 Incremental Timeout waiting for First or Next Fragment of an Application Layer Response:</p>	<input 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 _____		

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 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 _____		
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 <u>21600</u> seconds	21600	Front Panel
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 (group 70 var 6) using a status code value of file 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 Behavior:	<input checked="" type="checkbox"/> Discard the oldest event <input type="checkbox"/> Discard the newest event <input type="checkbox"/> Other, explain _____		
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>	All events are stored in the same event buffer. The buffer can hold at most 15 events.		

1.7 FILL OUT THE FOLLOWING ITEMS FOR OUTSTATIONS ONLY	Capabilities	Current Value	If configurable, list methods
<p>1.7.7 Sends Multi-Fragment Responses:</p> <p><i>Indicates whether an Outstation sends multi-fragment responses (Masters do not send multi-fragment requests).</i></p>	<p><input type="checkbox"/> Yes  <input checked="" type="checkbox"/> No</p>		
<p>1.7.8 DNP Command Settings preserved through a device reset:</p> <p><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 bit is set.</i></p>	<p><input type="checkbox"/> Assign Class  <input type="checkbox"/> Analog Deadbands  <input type="checkbox"/> Data Set Prototypes  <input type="checkbox"/> Data Set Descriptors</p>		

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>	<p><input type="checkbox"/> Not Supported  <input checked="" type="checkbox"/> Configurable, selectable from On and Off</p>	<p><input type="checkbox"/> Off  <input checked="" type="checkbox"/> On</p>	<p>Keypad</p>
<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>	<p><input type="checkbox"/> Fixed at _____  <input checked="" type="checkbox"/> Configurable, range <u>  0  </u> to <u>65,519</u>  <input type="checkbox"/> Configurable, selectable from _____,_____,_____  <input type="checkbox"/> Configurable, other, describe _____</p>	<p>3</p>	<p>Keypad</p>
<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 timeouts, or it may be a separate parameter.</i></p>	<p><input type="checkbox"/> Fixed at _____ms  <input checked="" type="checkbox"/> Configurable, range <u> 1000 </u> to <u>254000</u> ms  <input type="checkbox"/> Configurable, selectable from _____,_____,_____  <input type="checkbox"/> Configurable, other, describe _____  <input type="checkbox"/> Variable, explain _____</p>	<p>5 seconds</p>	<p>Keypad</p>

1.8 OUTSTATION UNSOLICITED RESPONSE SUPPORT	Capabilities	Current Value	If configurable, list methods
<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>	<p> <input type="checkbox"/> None  <input type="checkbox"/> Fixed at _____  <input type="checkbox"/> Configurable, range _____ to _____  <input checked="" type="checkbox"/> Configurable, selectable from <u>0</u>, <u>254</u>, <u>Inf</u>  <input type="checkbox"/> Configurable, other, describe _____  <input type="checkbox"/> Always infinite, never gives up </p>	<p>10</p>	<p>Front Panel</p>

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 checked="" type="checkbox"/> Fixed at <u>1</u> <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		
1.9.2 Number of class 2 events:	<input checked="" type="checkbox"/> Class 2 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 _____		
1.9.3 Number of class 3 events:	<input checked="" type="checkbox"/> Class 3 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 _____		
1.9.4 Total number 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 configured 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 <u>0</u> ms <input type="checkbox"/> Configurable, range _____ to _____ ms <input type="checkbox"/> Configurable, selectable from _____, _____, _____ ms <input type="checkbox"/> Configurable, other, describe _____		
1.9.6 Hold time after class 2 event: <i>A configured value of 0 indicates that responses are not delayed due to this parameter.</i>	<input checked="" type="checkbox"/> Class 2 not used to trigger Unsolicited Responses <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 _____		

1.9 OUTSTATION UNSOLICITED RESPONSE TRIGGER CONDITIONS	Capabilities	Current Value	If configurable, list methods
<p>1.9.7 Hold time after class 3 event:  <i>A configured value of 0 indicates that responses are not delayed due to this parameter.</i></p>	<input checked="" type="checkbox"/> Class 3 not used to trigger Unsolicited Responses <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 _____		
<p>1.9.8 Hold time after event assigned to any class:  <i>A configured value of 0 indicates that responses are not delayed due to this parameter.</i></p>	<input type="checkbox"/> Class events not used to trigger Unsolicited Responses <input checked="" type="checkbox"/> Fixed at ____0____ ms <input type="checkbox"/> Configurable, range _____ to _____ ms <input type="checkbox"/> Configurable, selectable from _____, _____, _____ ms <input type="checkbox"/> Configurable, other, describe _____		
<p>1.9.9 Retrigger Hold Timer:  <i>The hold-time timer may be retriggered for each new event detected (increased possibly of capturing all the changes in a single response) or not retriggered (giving the master a guaranteed update time).</i></p>	<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)		
<p>1.9.10 Other Unsolicited Response Trigger Conditions:</p>	<hr/> <hr/> <hr/>		

1.10 OUTSTATION PERFORMANCE	Capabilities	Current Value	If configurable, list methods
<p>1.10.1 Maximum Time Base Drift (milliseconds per minute):</p> <p><i>If the protocol is synchronized by DNP, what is the clock drift rate over the full operating temperature range.</i></p>		5 milliseconds / minute	
<p>1.10.2 When does outstation set IIN1.4?</p>	<p><input type="checkbox"/> Never</p> <p><input checked="" type="checkbox"/> Asserted at startup until first Time Synchronization request received</p> <p><input type="checkbox"/> Periodically, range ___to___ seconds</p> <p><input type="checkbox"/> Periodically, selectable from ____, ____, ___ seconds</p> <p><input checked="" type="checkbox"/> Range <u>60</u> to <u>65534</u> 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 ____, ____, ___</p>	21600 seconds (6 hrs)	Front panel Keypad
<p>1.10.3 Maximum Internal Time Reference Error when set via DNP (ms):</p> <p><i>The difference between the time set in a DNP Write Time message, and the time actually set in the Outstation.</i></p>		50 milliseconds + LAN delay	
<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>		10 milliseconds	

<b>1.10 OUTSTATION PERFORMANCE</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
<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>		20 milliseconds	
<p>1.10.6 Maximum time from start-up to IIN 1.4 assertion (ms):</p>		0 milliseconds	
<p>1.10.7 Maximum Event Time-tag error for local Binary and Double-bit I/O (ms):</p> <p><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></p>		2100 milliseconds	
<p>1.10.8 Maximum Event Time-tag error for local I/O other than Binary and Double-bit data types (ms):</p>		2100 milliseconds	

<b>1.11 INDIVIDUAL FIELD OUTSTATION PARAMETERS:</b>	<b>Value of Current Setting</b>	<b>If configurable, list methods</b>
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 61850 object models. The 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 data 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 Communication 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 printed version of the Device Profile Document to give an idea of the Logical Devices, Logical Notes, and Attributes available via the DNP interface. The following is an example table format:

<b>IEC 61850 Object</b>	<b>DNP3 XPATH Reference</b>	<b>Comments</b>

### **3 CAPABILITIES AND CURRENT SETTINGS FOR DEVICE DATABASE (OUTSTATION ONLY)**

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. Tables for data types not supported may be deleted. Additional columns may be added to the point list table if necessary.

<b>3.1 SINGLE-BIT BINARY INPUTS</b> Static (Steady-State) Group Number: 1 Event Group Number: 2	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 (add column to table below)	Variation #1	
3.1.2 Event Variation reported when variation 0 requested:	<input type="checkbox"/> Variation 1 – without time <input checked="" type="checkbox"/> Variation 2 – with absolute time <input type="checkbox"/> Variation 3 – with relative time <input type="checkbox"/> Based on point Index (add column to table below)		
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. All events are typically reported for Binary Inputs.</i>	<input type="checkbox"/> Only most recent <input checked="" type="checkbox"/> All events		
3.1.4 Binary Inputs included in Class 0 response:  <i>If Binary Inputs are not included in the Class 0 response, Binary Input Events (group 2) 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 (add column to table below)		
3.1.5 Definition of Binary Input Point List:  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<input checked="" 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 _____		

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Name for State when value is 0	Name for State when value is 1	Description
0	LVDC Alarm	1	Clear	Set	DC output voltage < user settable voltage if Set
1	HVDC Alarm	1	Clear	Set	DC output voltage > user settable voltage if Set
2	HVSD Alarm	1	Clear	Set	Charger is in High voltage shutdown mode if Set
3	NC Alarm	1	Clear	Set	DC amps < user settable minimum if Set
4	OC Alarm	1	Clear	Set	DC amps > user settable maximum if Set
5	GND+	1	Clear	Set	Positive ground fault detected if set
6	GND-	1	Clear	Set	Negative ground fault detected if set
7	ACF	1	Clear	Set	AC input failure detected if set
8	EQ	1	Clear	Set	Equalization in progress if set
9	VLVA	1	Clear	Set	Very low voltage detected if set
10	HBTA	1	Clear	Set	High battery temperature detected if set
11	RECTF	1	Clear	Set	Rectifier failure detected if set
12	SUMM	1	Clear	Set	Summary alarm condition detected if set
13	Remote Equalize	1	Clear	Set	Local interface board input forcing equalization mode

<b>3.2 DOUBLE-BIT INPUT POINTS</b> Static (Steady-State) Group Number: 3 Event Group Number: 4	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.2.1 Static Variation reported when variation 0 requested:	<input type="checkbox"/> Variation 1 – Double-bit Packed format <input type="checkbox"/> Variation 2 – Double-bit with flag <input type="checkbox"/> Based on point Index (add column to table below)		
3.2.2 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"/> Variation 3 – with relative time <input type="checkbox"/> Based on point Index (add column to table below)		
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 events or only the most recent event. All events are typically reported for Double-bit Inputs.</i>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		
3.2.4 Double-bit Inputs included in Class 0 response:  <i>If Double-bit Inputs are not included in the Class 0 response, Double-bit Input Events (group 4) 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 (add column to table below)		
3.2.5 Definition of Double-bit Input Point List:  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<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_____		

<b>Point Index</b>	<b>Name</b>	<b>Default Class Assigned to Events (1, 2, 3 or none)</b>	<b>Name for State when value is 0 (Intermediate)</b>	<b>Name for State when value is 1 (Off)</b>	<b>Name for State when value is 2 (On)</b>	<b>Name for State when value is 3 (Indeterminate)</b>	<b>Description</b>
0							
1							
2							
:	Add more rows as necessary						
:							

<b>3.3 BINARY OUTPUT STATUS AND CONTROL RELAY OUTPUT BLOCK</b> Binary Output Status Group Number: <b>10</b> Binary Output Event Group Number: <b>11</b> CROB Group Number: <b>12</b> Binary Output Command Event Object Num: <b>13</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.3.1 Minimum pulse time allowed with Trip, Close, and Pulse On commands:	<input type="checkbox"/> Fixed at _____ms (hardware may limit this further) <input type="checkbox"/> Based on point Index (add column to table below)		
3.3.2 Maximum pulse time allowed with Trip, Close, and Pulse On commands:	<input type="checkbox"/> Fixed at _____ms (hardware may limit this further) <input type="checkbox"/> Based on point Index (add column to table below)		
3.3.3 Binary Output Status included in Class 0 response:  <i>If Binary Output Status points are not included in the Class 0 response, Binary Output Status Events (group 11) 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 (add column to table below)		
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		
3.3.5 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 (add column to table below)		
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 (add column to table below)		
3.3.7 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		

<p>3.3.8 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>	<input type="checkbox"/> Only most recent <input type="checkbox"/> All events		
<p>3.3.9 Maximum Time between Select and Operate:</p>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Fixed at <u>4</u> 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 (add column to table below)		
<p>3.3.10 Definition of Binary Output Status/Control relay output block (CROB) Point List:</p> <p><i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i></p>	<input checked="" 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 _____		

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	LVDC Alarm	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for LVDC Alarm
1	HVDC Alarm	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for HVDC Alarm
2	HVSD Alarm	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for HVSD Alarm
3	NC Alarm	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for NC Alarm
4	OC Alarm	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for OC Alarm
5	GND+/-	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for GND+/- Fault Alarm
6	ACF	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for ACF Alarm
7	EQ	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for EQ Alarm
8	VLVA	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for VLV Alarm
9	HBTA	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for HBT alarm output
10	RECTF	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable for RECTF Alarm
11	SUM LVDC	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable LVDC alarm for summary alarm output
12	SUM HVDC	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable HVDC alarm for summary alarm output
13	SUM HVSD	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable HVSD alarm for summary alarm output
14	SUM NC	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable NC alarm for summary alarm output
15	SUM OC	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable OC alarm for summary alarm output
16	SUM GND+/-	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable GND+/- Fault alarm for summary alarm output
17	SUM ACF	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable ACF alarm for summary alarm output
18	SUM EQ	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable EQ alarm for summary alarm output
19	SUM VLVA	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable VLV alarm for summary alarm output
20	SUM HBTA	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable high battery temperature for summary alarm output
21	SUM RECTF	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable RECTF alarm for summary alarm output
22	TCO Enable	✓	✓	✓			✓	✓					Enabled	Disabled	none	none	Enable battery temperature based output voltage adjustment

<b>3.4 COUNTERS/FROZEN COUNTERS</b> Static Counter Group Number: <b>20</b> Static Frozen Counter Group Number: <b>21</b> Counter Event Group Number: <b>22</b> Frozen Counter Event Group Number: <b>23</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.4.1 Static 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 without flag <input type="checkbox"/> Variation 6 – 16-bit without flag <input type="checkbox"/> Based on point Index (add column to table below)		
3.4.2 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 with flag and time <input type="checkbox"/> Variation 6 – 16-bit with flag and time <input type="checkbox"/> Based on point Index (add column to table below)		
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 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 (add column to table below)		
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 type="checkbox"/> Only most recent <input type="checkbox"/> All events		
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 (add column to table below)		

<b>3.4 COUNTERS/FROZEN COUNTERS</b> Static Counter Group Number: <b>20</b> Static Frozen Counter Group Number: <b>21</b> Counter Event Group Number: <b>22</b> Frozen Counter Event Group Number: <b>23</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 with flag and time <input type="checkbox"/> Variation 6 – 16-bit with flag and time <input type="checkbox"/> Based on point Index (add column to table below)		
3.4.7 Frozen Counters included in Class 0 response:  <i>If Frozen Counters are not included in the Class 0 response, Frozen Counter Events (group 23) 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 (add column to table below)		
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"/> Other Fixed Value _____ <input type="checkbox"/> Configurable; range _____ to _____ <input type="checkbox"/> Configurable, selectable from ____, ____, ____ <input type="checkbox"/> Configurable, other, describe _____ <input type="checkbox"/> Based on point Index (add column to table below)		
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 _____		

<b>3.4 COUNTERS/FROZEN COUNTERS</b> Static Counter Group Number: <b>20</b> Static Frozen Counter Group Number: <b>21</b> Counter Event Group Number: <b>22</b> Frozen Counter Event Group Number: <b>23</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.4.11 Definition of Counter/Frozen Counter Point List:  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<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 _____		

Point Index	Name	Default Class Assigned to Counter Events (1, 2, 3 or none)	Frozen Counter Exists (Yes or No)	Default Class Assigned to Frozen Counter Events (1, 2, 3 or none)	Description
0					
1					
2					
:	Add more rows				
:	as necessary				

<b>3.5 ANALOG INPUT POINTS</b> Static (Steady-State) Group Number: <b>30</b> Event Group Number: <b>32</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 checked="" 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 (add column to table below)	2	
3.5.2 Event Variation reported when variation 0 requested:	<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 checked="" type="checkbox"/> Variation 5 – single-precision floating point w/o time <input type="checkbox"/> Variation 6 – double-precision floating point w/o time <input checked="" 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 (add column to table below)	2	
3.5.3 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. Only the most recent event is typically reported for Analog Inputs.</i>	<input checked="" type="checkbox"/> Only most recent <input type="checkbox"/> All events		
3.5.4 Analog Inputs Included in Class 0 response:  <i>If Analog Inputs are not included in the Class 0 response, Analog Input Events (group 32) 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 (add column to table below)		

<b>3.5 ANALOG INPUT POINTS</b> Static (Steady-State) Group Number: <b>30</b> Event Group Number: <b>32</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.5.5 How Deadbands are set:	<input checked="" type="checkbox"/> A. Global Fixed <input type="checkbox"/> B. Configurable through DNP <input 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	Points 0-2, 8-16 = 0.15V  Points 5,6 = 1.0V  Points 3,4 = 0.0V  Point 7 = .10V	
3.5.6 Analog Deadband Algorithm:  <i>simple - just compares the difference from the previous reported value</i>  <i>integrating - keeps track of the accumulated change</i>  <i>other - indicating another algorithm</i>	<input checked="" type="checkbox"/> Simple <input type="checkbox"/> Integrating <input type="checkbox"/> Other, explain _____		
3.5.7 Definition of Analog Input Point List:  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<input checked="" 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 _____		

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Transmitted Value <sup>1</sup>		Scaling <sup>2</sup>		Units	Resolution <sup>3</sup>	Description
			Minimum	Maximum	Multiplier	Offset			
0	DC Volts External	1	0 / 0.0	16383 / 163.83	0.01	0.0	Volts	.01	Output voltage of the charger as measured on output of charger.
1	DC Volts Internal	1	0 / 0.0	16383 / 163.83	0.01	0.0	Volts	.01	Output voltage of the charger as measured before the DC breaker.
2	DC Amps	1	0 / 0.0	14745 / 147.45	0.01	0.0	Amps	.01	DC Ampere output of charger
3	Voltage Rating	1	2400 / 24.0	13000 / 130.0	0.01	0.0	Volts	1.0	Charger Output voltage rating (depends on model)
4	Ampere Rating	1	600 / 6.0	10000 / 100.0	0.01	0.0	Amps	1.0	Charger Output Ampere rating (depends on model)
5	Battery Temperature	1	-1500 / -15.0	14900 / 149.00	0.01	0.0	Celsius	0.014	Temperature of the battery as measured using an external temperature sensor.
6	Control Board Temperature	1	-500 / -5.00	10000 / 100.00	0.01	0.0	Celsius	.01	Temperature of the Charger Control board
7	TC Voltage Offset	1	-900 / -9.00	1500 / 15.00	0.01	0.0	Volts	.01	Temperature Compensation Voltage used to adjust battery voltage based on battery temperature.
8	Over current Voltage Offset	1	0 / 0.0	16383 / 163.83	0.01	0.0	Volts	.01	Voltage offset controller is using to reduce output amps to < current limit
9	Load Share Voltage Offset	1	0 / 0.0	195 / 1.95	0.01	0.0	Volts	.01	Load Sharing offset (compensation) voltage
10	Manual Equalize Time Remaining	1	0 / 0.0	32767 / 32767.0	1.0	0	Minutes	1	Time left for manual equalization mode.
11	AC Fail EQ Time	1	0 / 0.0	32767 / 32767.0	1.0	0	Minutes	1	Time left for AC Failure equalization mode.
12	Periodic EQ Time	1	0 / 0.0	32767 / 32767.0	1.0	0	Minutes	1	Time left for Periodic equalization mode.
13	Charger Mode	1	0 / 0.0	400 / 4.0	0.01	0	N/A	1	The charger's mode
14	Number of Cells	1	0 / 0.0	60 / 60.0	1.0	0.0	N/A	1.0	Number of cells that make up the battery string.
15	Control Board	1	0 / 0.0	32767 / 327.67	0.01	0.0	N/A	N/A	Software Version of charger control board

<sup>1</sup> The minimum and maximum transmitted values are the lowest and highest values that the outstation will report in DNP analog input objects. These values are integers if the outstation transmits only integers. If the outstation is capable of transmitting both integers and floating-point, then integer and floating-point values are required for the minimums and maximums.

For example, a pressure sensor is able to measure 0 to 500 kPa. The outstation provides a linear conversion of the sensor's output signal to integers in the range of 0 to 25000 or floating-point values of 0 to 500.000. The sensor and outstation are used in an application where the maximum possible pressure is 380 kPa. For this input, the minimum transmitted value would be stated as 0 / 0.0 and the maximum transmitted value would be stated as 19000 / 380.000.

<sup>2</sup> The scaling information for each point specifies how data transmitted in integer variations (16 bit and 32 bit) is converted to engineering units when received by the Master (i.e. scaled according to the equation: scaled value = multiplier \* raw + offset). Scaling is not applied to Floating point variations since they are already transmitted in engineering units.

<sup>3</sup> Resolution is the smallest change that may be detected in the value due to quantization errors and is given in the units shown in the previous column. This parameter does not represent the accuracy of the measurement.

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Transmitted Value <sup>1</sup>		Scaling <sup>2</sup>		Units	Resolution <sup>3</sup>	Description
			Minimum	Maximum	Multiplier	Offset			
	Revision								
16	DNP3 Board Software Revision	None	0 / 0.0	32767 / 327.67	0.01	0.0	N/A	N/A	Revision of DNP3 Communication board Software
17	DNP3 Level	None	0 / 0.0	2 / 2.0	1.00	0.0	N/A	N/A	Level of DNP3 compliance as per Interoperability Specification

<b>3.6 ANALOG OUTPUT STATUS AND ANALOG OUTPUT CONTROL BLOCK</b> Analog Output Status Group Number: <b>40</b> Analog Output Control Block Group Number: <b>41</b> Analogue Output Event Group Number: <b>42</b> Analogue Output Command Event Group Number: <b>43</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
<b>3.6.1</b> Static Analog Output Status 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 – single-precision floating point with flag <input type="checkbox"/> Variation 4 – double-precision floating point with flag <input type="checkbox"/> Based on point Index (add column to table below)	2	
<b>3.6.2</b> 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 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 (add column to table below)		
<b>3.6.3</b> 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		
<b>3.6.4</b> 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 (add column to table below)	Not supported	

<b>3.6 ANALOG OUTPUT STATUS AND ANALOG OUTPUT CONTROL BLOCK</b> Analog Output Status Group Number: <b>40</b> Analog Output Control Block Group Number: <b>41</b> Analogue Output Event Group Number: <b>42</b> Analogue Output Command Event Group Number: <b>43</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.6.5 Command 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 (add column to table below)	Not supported	
3.6.6 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	Not supported	
3.6.7 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	Not supported	
3.6.8 Maximum Time between Select and Operate:	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> Fixed at <u>4</u> 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 (add column to table below)		

<b>3.6 ANALOG OUTPUT STATUS AND ANALOG OUTPUT CONTROL BLOCK</b> Analog Output Status Group Number: <b>40</b> Analog Output Control Block Group Number: <b>41</b> Analogue Output Event Group Number: <b>42</b> Analogue Output Command Event Group Number: <b>43</b>	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
<b>3.6.9 Definition of Analog Output Status/Analog Output Control Block Point List:</b>  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<input checked="" 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 _____		



Point Index	Name	Supported Control Operations			Transmitted Value		Scaling <sup>4</sup>		Units	Resolution <sup>5</sup>	Default Event Assigned Class (1, 2, 3 or none)		Description
		Select/Operate	Direct Operate	Direct Operate - No ACK	Minimum	Maximum	Multiplier	Offset			Change	Command	
0	Float Voltage Set point	✓	✓	✓	0 / 0.0	16383 / 163.83	.01	0.0	Volts	.01	none	none	Desired Float Voltage output
1	Equalize Voltage Set point	✓	✓	✓	0 / 0.0	16383 / 163.83	.01	0.0	Volts	.01	none	none	Desired Equalization Voltage output
2	Current Limit Set Point	✓	✓	✓	480 / 4.80	11000 / 110.00	.01	0.0	Amperes	.01	none	none	Desired Current limit on output 80% -> 100% of rated amp output
3	No Charge Alarm Set Point	✓	✓	✓	0 / 0.0	500 / 5.00	.01	0.0	Amperes	.01	none	none	The No Charge Alarm triggers below this set point.
4	Manual Equalization Time Remaining	✓	✓	✓	0 / 0.0	15420 / 15420.0	1.0	0.0	Minutes	1	none	none	Manual Equalization time remaining in minutes.
5	HVDC set point	✓	✓	✓	0 / 0.0	16383 / 163.83	.01	0.0	Volts	.01	none	none	Desired Voltage output over which will activate the High voltage alarm
6	HVSD set point	✓	✓	✓	0 / 0.0	16383 / 163.83	.01	0.0	Volts	.01	none	none	Desired Voltage output over which will activate the High voltage shutdown alarm as well as trip AC input breaker.
7	LVDC set point	✓	✓	✓	0 / 0.0	16383 / 163.83	.01	0.0	Volts	.01	none	none	Desired Voltage output under which will activate the Low voltage alarm
8	Ground Fault Set Point	✓	✓	✓	0 / 0.0	20000 / 20000.0	1.0	0.0	Ohms	1	none	none	A ground fault will occur if a resistance < this set point is found between ground and either of the +/- terminals
8	VLVA set point	✓	✓	✓	18 / 18.0	26.4 / 26.4	1.0	0.0	Volts	1	none	none	Desired Voltage output under which will activate the Very Low voltage alarm
8	High Battery temp	✓	✓	✓	0 / 0.0	200 / 200.0	1.0	0.0	°C	1	none	none	Desired Battery temp over which will activate the Battery High temp alarm
9	Temp Comp	✓	✓	✓	-1000 / -10.0	-10 / -0.10	.01	0.0	mV /cell /°C	.1	none	none	Temperature Compensation in mV per cell per degree Celsius

<sup>4</sup> The scaling information for each point specifies how data transmitted in integer variations (16 bit and 32 bit) is converted to engineering units when received by the Master (i.e. scaled according to the equation: scaled value = multiplier \* raw + offset). Scaling is not applied to Floating point variations since they are already transmitted in engineering units.

<sup>5</sup> Resolution is the smallest change that may be detected in the value due to quantization errors and is given in the units shown in the previous column. This parameter does not represent the accuracy of the measurement.



<b>3.7 SEQUENTIAL FILE TRANSFER</b> Group Number: 70	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 _____ (enter 0 if files are not supported) <input type="checkbox"/> Configurable, range _____ to _____ <input type="checkbox"/> Configurable, selectable from _____, _____, _____ <input type="checkbox"/> Configurable, other, describe _____		

<b>3.7 SEQUENTIAL FILE TRANSFER</b> Group Number: 70	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 _____		

File Name	Default Class Assigned to Events (1, 2, 3 or none)	Authentication Required for:			Description
		Read	Write	Delete	
Add more rows as necessary					

<b>3.8 OCTET STRING POINTS</b> Static (Steady-State) Group Number: 110 Event Group Number: 111	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
<b>3.8.1 Event reporting mode:</b> <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		
<b>3.8.2 Octet Strings Included in Class 0 response:</b> <i>If Octet Strings are not included in the Class 0 response, Octet String Events (group 111) may not be reported.</i>	<input type="checkbox"/> Always <input checked="" type="checkbox"/> Never <input type="checkbox"/> Only if point is assigned to Class 1, 2, or 3 <input type="checkbox"/> Based on point Index (add column to table below)		
<b>3.8.3 Definition of Octet String Point List:</b> <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<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_____		

Point Index	Name	Default Class Assigned to Events (1, 2, 3 or none)	Description
0			
1			
2			
:	Add more rows as necessary		
:			

<b>3.9 VIRTUAL TERMINAL PORT NUMBERS (POINTS)</b> Static (Steady-State) Group Number: 112 Event Group Number: 113	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.9.1 Definition of Virtual Terminal Port Numbers:  <i>List all addressable points. Points that do not exist (for example, because an option is not installed) shall be omitted from the table.</i>	<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 _____	Not supported	

Virtual Port Number (Point Index)	Name	Default Class Assigned to Events (1, 2, 3 or none)	Description
0			
1			
2			
:	Add more rows as necessary		

<b>3.10 DATA SET PROTOTYPE</b> Group Number: <b>85</b> Variation Number: <b>1</b>  Duplicate this table for each Data Set Prototype defined	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
3.10.1 Definition of Data Set Prototypes:	<input type="checkbox"/> Fixed, a Data Set Prototype is shown in table below <input type="checkbox"/> Configurable, list methods: _____ (a currently defined Data Set Prototype may be shown in table below) <input type="checkbox"/> Other, explain _____	Not supported	
3.10.2 Description:	_____ _____		

Element Number	Descriptor Code (check one)							Element Description	Data Type Code (check one)								Maximum Data Length	Ancillary Value: ID= Identifier number UUID= UUID value NSPC= Prototype namespace NAME= Prototype name DAEL= Data element name CTLS= Control status name CTLV= Control value name
	ID	UUID	NSPC	NAME	DAEL	CTLS	CTLV		NONE	VSTR	UINT	INT	FLT	OSTR	BSTR	TIME		
0	X							Mandatory DNP identifier			X							
1		X						UUID assigned to prototype					X					
2																		
⋮								Add more rows as necessary										
⋮																		

<b>3.11 DATA SET DESCRIPTOR CONTENTS AND CHARACTERISTICS</b> Group Number: <b>86</b> Variation Number: <b>1</b>  Duplicate this table for each Data Set Descriptor defined	<b>Capabilities</b>	<b>Current Value</b>	<b>If configurable, list methods</b>
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 _____	Not supported	
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	Not supported	
3.11.4 Default Event Assigned Class:	<input type="checkbox"/> Class 1 <input type="checkbox"/> Class 2 <input type="checkbox"/> Class 3	Not supported	
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	Not supported	

Element Number	Descriptor Code (check one)						Element Description	Data Type Code (check one)								Maximum Data Length	Ancillary Value: ID= Identifier number NAME= Prototype name DAEL= Data element name CTLS= Control status name CTLV= Control value name PTYP= UUID and name of elements
	ID	NAME	DAEL	CTLS	CTLV	PTYP		NONE	VSTR	UINT	INT	FLT	OSTR	BSTR	TIME		
0	X						Mandatory DNP identifier			X							
1																	
2																	
...							Add more rows as necessary										

### 3.12 DATA SET DESCRIPTOR – POINT INDEX ATTRIBUTES

Group Number: **86**

Variation Number: **3**

The following table is optional and correlates data set elements to point indexes of standard DNP3 Data Objects. The element number below refers to the position in the present value (object 87) or event (object 88) data set and will not match the element number in the data set descriptor or data set prototype tables above.

Duplicate this table for each Data Set Descriptor defined

Element Number	Link to Standard Data Point	
	Group Number	Point Index
0		
1		
2		
⋮	Add more rows as necessary	

## 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.

**NOTE**

The implementation table must list all functionality required by the device whether Master or Outstation as defined within the DNP3 IED Conformance Test Procedures. Any functionality beyond the highest subset level supported is indicated by **highlighted** rows. Any Object Groups not provided by an outstation or not processed by a Master are indicated by ~~strikethrough~~ (note these Object Groups will still be parsed).

## 4.1 LEVEL 2 DNP3 IMPLEMENTATION (DNP3-L2)

This section describes the second smallest subset of the DNP3 Application Layer. This implementation level is called Level 2 (L2).

### 4.1.1 Intended Use

This level contains a few more features than the Level 1 implementation. It is intended for communications between a master station or data concentrator and a device that could be called either a large Intelligent Electronic Device (IED) or a small Remote Terminal Unit (RTU). Typically, the input and output points of such a device would be local to the device.

### 4.1.2 General Description

A Level 2 Outstation implementation is the same as a Level 1 Outstation implementation with the following additions:

- A Level 2 Outstation accepts FREEZE requests on Binary Counter objects (not Analog Input objects or Frozen Counters). See *Freeze Operations in appendix*.
- A Level 2 Outstation parses READ requests for variation 0 of specific objects.
- A Level 2 Outstation parses READ requests for variations 1, 2 and 3 of Binary Input Change objects.
- A Level 2 Outstation parses READ requests for Frozen Counter objects and may report Frozen Counter objects (but not Frozen Delta Counters)

### 4.1.3 Implementation Table

The following Table describes the objects, function codes, and qualifiers used in a Level 2 DNP3 implementation.

DNP Object Group & Variation			Request Master may issue outstation must parse		RESPONSE Master must parse Outstation may issue	
Group Num	Var Num	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input – Any Variation	1 (read)	06 (no range, or all)		
1	1*	Binary Input – Packed format			129 (response)	00, 01 (start-stop)
1	2	Binary Input – With flags			129 (response)	00, 01 (start-stop)
2	0	Binary Input Event – Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
2	1	Binary Input Event – Without time		06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol.resp)	17, 28 (index)
2	2*	Binary Input Event – With absolute time		06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol.resp)	17, 28 (index)
2	3	Binary Input Event – With relative time		06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol.resp)	17, 28 (index)
10	0	Binary Output – Any Variation	1 (read)	06 (no range, or all)		
10	2*	Binary Output – Output status with flags			129 (response)	00, 01 (start-stop)
12	1	Binary Command – Control relay output block (CROB)	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, no ack)	17, 28 (index)	129 (response)	echo of request
20	0	Counter – Any Variation	1 (read) 7 (freeze) 8 (freeze noack) 9 (freeze clear) 10 (frz. cl. noack)	06 (no range, or all)	-	-
20	1	Counter – 32-bit with flag	-	-	129 (response)	00, 01 (start-stop)
20	2	Counter – 16-bit with flag	-	-	129 (response)	00, 01 (start-stop)

20	5	Counter – 32-bit without flag	-	-	129 (response)	00, 01 (start-stop)
20	6	Counter – 16-bit without flag	-	-	129 (response)	00, 01 (start-stop)
24	0	Frozen Counter – Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)	-	-
24	4	Frozen Counter – 32-bit with flag	-	-	129 (response)	00, 01 (start-stop)
24	2	Frozen Counter – 16-bit with flag	-	-	129 (response)	00, 01 (start-stop)
24	9	Frozen Counter – 32-bit without flag	-	-	129 (response)	00, 01 (start-stop)
24	10	Frozen Counter – 16-bit without flag	-	-	129 (response)	00, 01 (start-stop)
22	0	Counter Event – Any variation	1 (read)	06 (no range, or all)	-	-
22	4	Counter Event – 32-bit with flag	-	-	129 (response) 130 (unsol.resp)	17, 28 (index)
22	2	Counter Event – 16-bit with flag	-	-	129 (response) 130 (unsol.resp)	17, 28 (index)
30	0	Analog Input – Any variation	1 (read)	06 (no range, or all)		
30	1	Analog Input – 32-bit with flag	1 (read)	06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	2*	Analog Input – 16-bit with flag	1 (read)	06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	3	Analog Input – 32-bit without flag	1 (read)	06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	4	Analog Input – 16-bit without flag	1 (read)	06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	5	Analog Input – Single-prec flt-pt with flag	1 (read)	06 (no range, or all)		
32	0	Analog Input Event – Any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1	Analog Input Event – 32-bit without time			129 (response) 130 (unsol. resp)	17, 28 (index)
32	2*	Analog Input Event – 16-bit without time			129 (response) 130 (unsol. resp)	17, 28 (index)
40	0	Analog Output Status – Any Variation	1 (read)	06 (no range, or all)		
40	1	Analog Output Status – 32 bit with flag	1 (read)	06 (no range, or all)		
40	2*	Analog Output Status – 16-bit with flag	1 (read)	06 (no range, or all)	129 (response)	00, 01 (start-stop)
40	3	Analog Output – Single-prec flt-pt with flag	1 (read)	06 (no range, or all)		
41	2	Analog Output – 16-bit	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, no ack)	17,28 (index)	129 (response)	echo of request
50	1	Time and Date – Absolute time	2 (write)	07 (limited qty = 1)		
51	1	Time and Date CTO – Absolute time, synchronized			129 (response) 130 (unsol.resp)	07 (limited qty) qty = 1
51	2	Time and Date CTO – Absolute time, unsynchronized			129 (response) 130 (unsol.resp)	07 (limited qty) qty = 1
52	1	Time Delay – Coarse			129 (response)	07 (limited qty) qty = 1
52	2	Time Delay – Fine			129 (response)	07 (limited qty) qty = 1
60	1	Class Objects – Class 0 data	1 (read)	06 (no range, or all)		
60	2	Class Objects – Class 1 data	1 (read) 20 (enable unsol.) 21 (disable unsol.)	06 (no range, or all) 07, 08 (limited qty) 06 (no range, or all)		
60	3	Class Objects – Class 2 data	1 (read) 20 (enable unsol.) 21 (disable unsol.)	06 (no range, or all) 07, 08 (limited qty) 06 (no range, or all)		
60	4	Class Objects – Class 3 data	1 (read) 20 (enable unsol.) 21 (disable unsol.)	06 (no range, or all) 07, 08 (limited qty) 06 (no range, or all)		
80	1	Internal Indications – Packed format	2 (write)	00 (start-stop) index=7		
		No Object (function code only)	13 (cold restart)			
		No Object (function code only)	14 (warm restart)			
		No Object (function code only)	23 (delay meas.)			
		No Object (function code only)	24 (rec. cur. time)			

Note: \* - Default variation reported for variation 0.