Hadron Xtorm
DNP3 Server
Device Profile Document

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DEVICE PROFILE REVISION HISTORY

Date	Revision[1]	Reason for change	Edited by
11/02/2015	A	First edition.	Nelson Theves
20/06/2016	B	Included new "Event reporting mode" option for analog inputs points.	Roque Eduardo Dapper

[1] *Revision of the Device Profile Document is indicated by a letter incremented with each new release. The most recent revision should match the "Device Profile Document Revision" (item 1.1.6) in the Current Device Settings Table.*

Contents

1 DEVICE PROPERTIES

This document is intended to be used for several purposes, including:

- Identifying the capabilities of a DNP3 device (Master Station or Outstation)
- Recording the settings of a specific instance of a device (parameter settings for a specific instance of the device in the user's total DNP3 estate)
- Matching user requirements to product capabilities when procuring a DNP3 device

The document is therefore structured to show, for each technical feature, the capabilities of the device (or capabilities required by the device when used for procuring).

It is also structured to show the current value (or setting) of each of the parameters that describe a specific instance of the device. This "current value" may also show a functional limitation of the device. For example when implementing secure authentication it is not required that all DNP3 devices accept aggressive mode requests during critical exchanges (see Device Profile 1.12.4), in which case a vendor would mark this current value as "No – does not accept aggressive mode requests".

Additionally, the current value may sometimes be used to show a value that a device can achieve because of hardware or software dependencies. An example of this is section 1.6.8 of the Device Profile (Maximum error in the time that the Master issues freeze requests) where this value may well depend upon tolerances of hardware components and interactions between software tasks. When the Device Profile current value is used in this way the corresponding entry in the capabilities column is grayed-out. Users should note that if an entry in the capabilities column of the Device Profile is grayed-out then there may be information in the current value column that is pertinent to the device's capabilities.

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.

If this document 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 clause 14.8.3.2 "ReferenceDevice and AuxillaryInfo" of the DNP3 Specification 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
1.1.1 Device Function: *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.*	☐ Master ■ Outstation	Outstation	
1.1.2 Vendor Name: *The name of the organization producing the device.*		Altus Sistemas de Automação	
1.1.3 Device Name: *The model and name of the device, sufficient to distinguish it from any other device from the same organization.*		Hadron Xtorm	
1.1.4 Device manufacturer's hardware version string:		N/A	
1.1.5 Device manufacturer's software version string:		N/A	
1.1.6 Device Profile Document Revision: *Version of the Device Profile Document is indicated by a letter incremented with each new release. This should match the latest version shown in the Revision History at the beginning of this document.*		A	
1.1.7 DNP Levels Supported for: *Indicate each DNP3 Level to which the device conforms fully. For Masters, requests and responses can be indicated independently.*	Requests and Responses ☐ None ■ Level 1 ■ Level 2 ■ Level 3 ☐ Level 4	Level 3	

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods
1.1.8 Supported Function Blocks: .	☐ Self-Address Reservation ☐ Object 0 – attribute objects ☐ Data Sets ☐ File Transfer ☐ Virtual Terminal ☐ Mapping to IEC 61850 Object Models defined in a DNP3 XML file ☐ Function code 31, activate configuration ☐ Secure Authentication (if checked then see 1.12)		
1.1.9 Notable Additions: *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.*	Supports all features of level 3 and some features of level 4 and 4+: Double-bit Binary Input (static and events), Binary Output Packed format, Counter and Frozen Counter events with time, Analog Input with single precision floating point (static and event), Analog Input Events with time, Analog Output Status with single precision floating point and Analog Output with single precision floating point.		
1.1.10 Methods to set Configurable Parameters:	☐ XML – Loaded via DNP3 File Transfer ☐ XML – Loaded via other transport mechanism ☐ Terminal – ASCII Terminal Command Line ■ Software – Vendor software named MasterTool Xtorm ☐ Proprietary file loaded via DNP3 file transfer ☐ Proprietary file loaded via other transport mechanism ☐ Direct – Keypad on device front panel ☐ Factory – Specified when device is ordered ■ Protocol – Set via DNP3 (e.g. assign class) ☐ Other – explain _____	Software MasterTool Xtorm	
1.1.11 DNP3 XML files available On-Line: *XML configuration file names that can be read or written through DNP3 File Transfer to a device* *A device's currently running configuration is returned by DNP3 on-line XML file read from the device.* *DNP3 on-line XML file write to a device will update the device's configuration when the Activate Configuration (function code 31) is received.* .	Rd Wr Filename Description of Contents ☐ dnpDP.xml Complete Device Profile ☐ dnpDPcap.xml Device Profile Capabilities ☐ dnpDPcfg.xml Device Profile config. values ☐ ☐ _____*.xml _____		

1.1 DEVICE IDENTIFICATION	Capabilities	Current Value	If configurable, list methods
1.1.12 External DNP3 XML files available Off-line: *XML configuration file names that can be read or written from an external system, typically from a system that maintains the outstation configuration.* *External off-line XML file read permits an XML definition of a new configuration to be supplied from off-line configuration tools.* *External off-line XML file write permits an XML definition of a new configuration to be supplied to off-line configuration tools.*	Rd Wr Filename — Description of Contents ☐ ☐ dnpDP.xml — Complete Device Profile ☐ ☐ dnpDPcap.xml — Device Profile Capabilities ☐ ☐ dnpDPcfg.xml — Device Profile config. values ☐ ☐ _____*.xml — _____		
1.1.13 Connections Supported:	☐ Serial ■ IP Networking (complete section 1.3) ☐ Other, explain _____	IP Networking	

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.1 Port Name *Name used to reference the communication port defined in this section.*	■ NET1 ■ NET2 ■ NET3 ■ NET4 ■ NET5 ■ NET6		Software MasterTool Xtorm
1.3.2 Type of End Point:	☐ TCP Initiating (Master Only) ■ TCP Listening (Outstation Only) ☐ TCP Dual (required for Masters) ☐ UDP Datagram (required)	TCP Listening	
1.3.3 IP Address of this Device:			Software MasterTool Xtorm
1.3.4 Subnet Mask:			Software MasterTool Xtorm
1.3.5 Gateway IP Address:			Software MasterTool Xtorm
1.3.6 Accepts TCP Connections or UDP Datagrams from:	☐ Allows all (show as *.*.*.* in 1.3.7) ☐ Limits based on an IP address ☐ Limits based on list of IP addresses ☐ Limits based on a wildcard IP address ☐ Limits based on list of wildcard IP addresses ■ Other validation, depends on 1.3.16. Limits based on IP address if Method 1 is chosen. Allow all if Method 2 is chosen.	*Allows all (show as *.*.*.* in 1.3.7)*	Software MasterTool Xtorm
1.3.7 IP Address(es) from which TCP Connections or UDP Datagrams are accepted:		*.*.*.*	Software MasterTool Xtorm
1.3.8 TCP Listen Port Number: *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.*	☐ Not Applicable (Master w/o dual end point) ☐ Fixed at 20,000 ■ Configurable, range 1 to 65535 ☐ Configurable, selectable from ☐ Other, explain:	20000	Software MasterTool Xtorm

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.9 TCP Listen Port Number of remote device: *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.*	■ Not Applicable (Outstation w/o dual end point) ☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:		
1.3.10 TCP Keep-alive timer: *The time period for the keep-alive timer on active TCP connections.*	☐ Fixed at ms ■ Configurable, range 1 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain:	10	Software MasterTool Xtorm
1.3.11 Local UDP port: *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.*	☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Let system choose (Master only)	N/A	
1.3.12 Destination UDP port for DNP3 Requests (Master Only):	☐ Fixed at 20,000 ☐ Configurable, range ☐ Configurable, selectable from ☐ Other, explain:		
1.3.13 Destination UDP port for initial unsolicited null responses (UDP only Outstations): *For a UDP only Outstation, the destination UDP port for sending initial unsolicited Null response*	☐ None ☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:	N/A	
1.3.14 Destination UDP port for responses: *For a UDP only Outstation, the destination UDP port for sending all responses other than initial unsolicited Null Response.*	☐ None ☐ Fixed at 20,000 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Use source port number	N/A	
1.3.15 Multiple outstation connections (Masters only): *Master only. Indicates whether multiple outstation connections are supported.*	☐ Supports multiple outstations (Masters only)		

1.3 IP NETWORKING	Capabilities	Current Value	If configurable, list methods
1.3.16 Multiple master connections (Outstations Only): *Outstation only. Indicates whether multiple master connections are supported and the method that can be used to establish connections.*	■ Supports multiple masters (Outstations only) If supported, the following methods may be used: ■ Method 1 (based on IP address) - required ■ Method 2 (based on TCP port number) - recommended ☐ Method 3 (browsing for static data) - optional	Method 2	Software MasterTool Xtorm
1.3.17 Time synchronization support:	■ DNP3 LAN procedure (function code 24) ■ DNP3 Write Time (not recommended over LAN) ■ Other, SNTP and IRIGB ☐ Not Supported		Software MasterTool Xtorm

1.4 LINK LAYER	Capabilities	Current Value	If configurable, list methods
1.4.1 Data Link Address: *Indicates if the link address is configurable over the entire valid range of 0 to 65,519. Data link addresses 0xFFF0 through 0xFFFF are reserved for broadcast or other special purposes.*	☐ Fixed at ■ Configurable, range 0 to 65519 ☐ Configurable, selectable from ☐ Other, explain:	4	Software MasterTool Xtorm
1.4.2 DNP3 Source Address Validation: *Indicates whether the Outstation will filter out messages not from a specific source address.*	☐ Never ☐ Always, one address allowed (shown in 1.4.3) ☐ Always, any one of multiple addresses allowed (each selectable as shown in 1.4.3) ■ Sometimes, explain: Configurable, Enable/Disable	Disable	Software MasterTool Xtorm
1.4.3 DNP3 Source Address(es) expected when Validation is Enabled: *Selects the allowed source address(es).*	☐ Configurable to any 16 bit DNP Data Link Address value ■ Configurable, range 0 to 65519 ☐ Configurable, selectable from ☐ Other, explain:	3	Software MasterTool Xtorm
1.4.4 Self Address Support using address 0xFFFC: *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.*	■ Yes (only allowed if configurable) ☐ No	Disable	Software MasterTool Xtorm
1.4.5 Sends Confirmed User Data Frames: *A list of conditions under which the device transmits confirmed link layer services (TEST_LINK_STATES, RESET_LINK_STATES, CONFIRMED_USER_DATA).*	■ Always ■ Sometimes, explain: Only for multi-frame fragments ■ Never	Never	Software MasterTool Xtorm
1.4.6 Data Link Layer Confirmation Timeout: *This timeout applies to any secondary data link message that requires a confirm or response (link reset, link status, user data, etc)*	☐ None ☐ Fixed at ms ■ Configurable, range 1 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:	1	Software MasterTool Xtorm

1.4 LINK LAYER	Capabilities	Current Value	If configurable, list methods
1.4.7 Maximum Data Link Retries: *The number of times the device will retransmit a frame that requests Link Layer confirmation.*	☐ Never Retries ☐ Fixed at _____ ■ Configurable, range 0 to 10 ☐ Configurable, selectable from☐ Other, explain:	0 Note: This value should be changed only when communicating with non-LAN masters.	Software MasterTool Xtorm
1.4.8 Maximum number of octets Transmitted in a Data Link Frame: *This number includes the CRCs. With a length field of 255, the maximum size would be 292.*	■ Fixed at 292 ☐ Configurable, range to ☐ Configurable, selectable from☐ Other, explain:	292	
1.4.9 Maximum number of octets that can be Received in a Data Link Frame: *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.*	■ Fixed at 292 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:	292	

1.5 APPLICATION LAYER	Capabilities	Current Value	If configurable, list methods
1.5.1 Maximum number of octets Transmitted in an Application Layer Fragment other than File Transfer: *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.*	☐ Fixed at ■ Configurable, range 249 to 2048 ☐ Configurable, selectable from ☐ Other, explain:	2048	Software MasterTool Xtorm
1.5.2 Maximum number of octets Transmitted in an Application Layer Fragment containing File Transfer:	☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:		
1.5.3 Maximum number of octets that can be Received in an Application Layer Fragment: *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.*	■ Fixed at 2048 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:	2048	
1.5.4 Timeout waiting for Complete Application Layer Fragment: *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.*	■ None ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:		
1.5.5 Maximum number of objects allowed in a single control request for CROB (group 12):	■ Fixed at 1 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Variable, explain:	1	
1.5.6 Maximum number of objects allowed in a single control request for Analog Outputs (group 41):	■ Fixed at 1 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Variable, explain:	1	

1.5 APPLICATION LAYER	Capabilities	Current Value	If configurable, list methods
1.5.7 Maximum number of objects allowed in a single control request for Data Sets (groups 85,86,87):	■ Fixed at 0 ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:☐ Variable, explain:	N/A	
1.5.8 Supports mixed object groups (AOBs, CROBs and Data Sets) in the same control request:	☐ Not applicable – controls are not supported ☐ Yes ■ No	N/A	
1.5.9 User Data *User Data entry*			

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.1 Timeout waiting for Complete Application Layer Response(ms): *Timeout on Master if all fragments of a response message are not received in the specified time.*	☐ None ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:		
1.6.2 Maximum Application Layer Retries for Request Messages: *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.*	☐ None (required) ☐ Fixed at☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Variable, explain:		
1.6.3 Incremental Timeout waiting for First or Next Fragment of an Application Layer Response:	☐ None ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:		
1.6.4 Issuing controls to off-line devices: *Indicates if the Master issues control requests to devices that are thought to be off-line (i.e. the Master has not seen responses to previous Master requests).*	☐ Not applicable – controls are not supported ☐ Yes ☐ No		
1.6.5 Issuing controls to off-scan devices: *Indicates if the Master issues control requests to devices that are currently off-scan (i.e. the Master has been configured not to issue poll requests to the device).*	☐ Not applicable – controls are not supported ☐ Yes ☐ No		

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.6 Maximum Application Layer Retries for Control Select Messages (same sequence number): *Indicates the number of times a Master will retransmit an application layer control select request message if a response is not received – using the same message sequence number.*	☐ None (required) ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Variable, explain:		
1.6.7 Maximum Application Layer Retries for Control Select Messages (new sequence number): *Indicates the number of times a Master will retransmit an application layer control select request message if a response is not received – using a new message sequence number.*	☐ None (required) ☐ Fixed at_____ ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Variable, explain:		
1.6.8 Maximum error in the time that the Master issues freeze requests: *If the Master is scheduled to issue freeze requests at a specific time, what is the maximum error in the time that the Master may actually issue a request?*			
1.6.9 Maximum error in the time that the Master schedules repetitive freeze requests: *If the Master is scheduled to issue freeze requests at a regular interval, what is the maximum error in the time interval that the Master may actually issue a request? (i.e. how early / late could the request actually be issued)?*			
1.6.10 Scheduled actions that may affect the accuracy of freeze requests: *Indicates if the Master's accuracy of issuing freeze requests may be affected by other scheduled operations such as poll requests or control requests*	☐ Freeze time may be affected by Poll requests ☐ Freeze time may be affected by Control requests		

1.6 FILL OUT THE FOLLOWING ITEMS FOR MASTERS ONLY	Capabilities	Current Value	If configurable, list methods
1.6.11 Master's algorithm for scheduling request operations: *Describe the Master's algorithm for determination of which activity is performed when more than one is due at the same moment. Discuss precedence and priorities for activities such as time synchronization, poll requests, control requests and freeze requests.*			

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:	☐ None ☐ Fixed at ms ■ Configurable, range 1 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:	1	Software MasterTool Xtorm
1.7.2 How often is time synchronization required from the master: *Details of when the master needs to perform a time synchronization to ensure that the outstation clock does not drift outside of an acceptable tolerance. If the option to relate this to IIN1.4 is used then details of when IIN1.4 is asserted are in section 1.10.2*	☐ Never needs time ☐ Within seconds after IIN1.4 is set ☐ Periodically, fixed at seconds ☐ Periodically, between and seconds ■ Configurable, see: 1.10.2 When does outstation set IIN1.4?		
1.7.3 Device Trouble Bit IIN1.6: *If IIN1.6 device trouble bit is set under certain conditions, explain the possible causes.*	■ Never used ☐ Reason for setting:		
1.7.4 File Handle Timeout: *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).*	■ Not applicable, files not supported ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:		
1.7.5 Event Buffer Overflow Behavior:	■ Discard the oldest event ☐ Discard the newest event ☐ Other, explain:	*Discard the oldest event*	Software MasterTool Xtorm
1.7.6 Event Buffer Organization: *Explain how event buffers are arranged (per Object Group, per Class, single buffer, etc,) and provide their sizes.*	Single buffer with fixed size: 4500 events	4500	Software MasterTool Xtorm

1.7 FILL OUT THE FOLLOWING ITEMS FOR OUTSTATIONS ONLY	Capabilities	Current Value	If configurable, list methods
1.7.7 Sends Multi-Fragment Responses: *Indicates whether an Outstation sends multi-fragment responses (Masters do not send multi-fragment requests).*	■ Yes ■ No	Yes	Software MasterTool Xtorm
1.7.8 Last Fragment Confirmation: *Indicates whether the Outstation requests confirmation of the last fragment of a multi-fragment response.*	■ Never ■ Always ☐ Sometimes, explain:	Always	Software MasterTool Xtorm
1.7.9 DNP Command Settings preserved through a device reset: *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.*	☐ Assign Class ☐ Analog Deadbands ☐ Data Set Prototypes ☐ Data Set Descriptors ☐ Function Code 31 Activate Configuration	No command settings are preserved after a reset.	

1.8 OUTSTATION UNSOLICITED RESPONSE SUPPORT	Capabilities	Current Value	If configurable, list methods
1.8.1 Supports Unsolicited Reporting: *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.*	☐ Not Supported ■ Configurable, selectable from On and Off	On	Software MasterTool Xtorm
1.8.2 Master Data Link Address: *The destination address of the master device where the unsolicited responses will be sent.*	☐ Fixed at ■ Configurable, range 0 to 65519 ☐ Configurable, selectable from ☐ Other, explain:	3	Software MasterTool Xtorm
1.8.3 Unsolicited Response Confirmation Timeout: *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.*	☐ Fixed at ms ■ Configurable, range 0 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain: ☐ Variable, explain:	1	Software MasterTool Xtorm
1.8.4 Number of Unsolicited Retries: *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.*	☐ None ☐ Fixed at ■ Configurable, range 0 to 65535 ☐ Configurable, selectable from ☐ Other, explain: ☐ Always infinite, never gives up	*0*	Software MasterTool Xtorm

1.8 OUTSTATION UNSOLICITED RESPONSE SUPPORT	Capabilities	Current Value	If configurable, list methods
1.8.5 User Data: *A User Data entry*			

1.9 OUTSTATION UNSOLICITED RESPONSE TRIGGER CONDITIONS	Capabilities	Current Value	If configurable, list methods
1.9.1 Number of class 1 events:	☐ Class 1 not used to trigger Unsolicited Responses ☐ Fixed at ■ Configurable, range 1 to 255 ☐ Configurable, selectable from ☐ Other, explain:	10	Software MasterTool Xtorm
1.9.2 Number of class 2 events:	☐ Class 2 not used to trigger Unsolicited Responses ☐ Fixed at ■ Configurable, range 1 to 255 ☐ Configurable, selectable from ☐ Other, explain:	10	Software MasterTool Xtorm
1.9.3 Number of class 3 events:	☐ Class 3 not used to trigger Unsolicited Responses ☐ Fixed at ■ Configurable, range 1 to 255 ☐ Configurable, selectable from ☐ Other, explain:	10	Software MasterTool Xtorm
1.9.4 Total number of events from any class:	☐ Total Number of Events not used to trigger Unsolicited Responses ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:		
1.9.5 Hold time after class 1 event: *A configured value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 1 not used to trigger Unsolicited Responses ☐ Fixed at ms ■ Configurable, range 0 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain:	1	Software MasterTool Xtorm
1.9.6 Hold time after class 2 event: *A configured value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 2 not used to trigger Unsolicited Responses ☐ Fixed at ms ■ Configurable, range 0 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain:	1	Software MasterTool Xtorm
1.9.7 Hold time after class 3 event: *A configured value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class 3 not used to trigger Unsolicited Responses ☐ Fixed at ms ■ Configurable, range 0 to 86400 s ☐ Configurable, selectable from ms ☐ Other, explain:	1	Software MasterTool Xtorm

1.9 OUTSTATION UNSOLICITED RESPONSE TRIGGER CONDITIONS	Capabilities	Current Value	If configurable, list methods
1.9.8 Hold time after event assigned to any class: *A configured value of 0 indicates that responses are not delayed due to this parameter.*	☐ Class events not used to trigger Unsolicited Responses ☐ Fixed at ms ☐ Configurable, range to ms ☐ Configurable, selectable from ms ☐ Other, explain:		
1.9.9 Retrigger Hold Timer: *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).*	☐ Hold-time timer will be retriggered for each new event detected (may get more changes in next response) ■ Hold-time timer will not be retriggered for each new event detected (guaranteed update time)		
1.9.10 Other Unsolicited Response Trigger Conditions:			

1.10 OUTSTATION PERFORMANCE	Capabilities	Current Value	If configurable, list methods
1.10.1 Maximum Time Base Drift (milliseconds per minute): *If the device is synchronized by DNP, what is the clock drift rate over the full operating temperature range.*	■ Fixed at 10 ms ☐ Range to ms ☐ Selectable from ms ☐ Other, describe:	10 ms	
1.10.2 When does outstation set IIN1.4? *When does the outstation set the internal indication IIN1.4 NEED_TIME.*	■ Never ■ Asserted at startup until first Time Synchronization request received ☐ Periodically, range to seconds ☐ Periodically, selectable from seconds ■ Range 1 to 86400 seconds after last time sync ☐ Selectable from seconds after last time sync ☐ When time error may have drifted by range to ms ☐ When time error may have drifted by selectable from	1	Software MasterTool Xtorm
1.10.3 Maximum Internal Time Reference Error when set via DNP (ms): *The difference between the time set in a DNP Write Time message, and the time actually set in the Outstation.*	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: Depends on system load and main task cycle		
1.10.4 Maximum Delay Measurement error (ms): *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.*	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: Depends on system load and main task cycle		
1.10.5 Maximum Response time (ms): *The amount of time an Outstation will take to respond upon receipt of a valid request. This does not include the message transmission time.*	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: It depends of the data accessed: for read function, that access only local data, the maximum response time depends only from the system load. For other functions, like direct operate, the response time can depend from external IEDs. [1]		

1.10 OUTSTATION PERFORMANCE	Capabilities	Current Value	If configurable, list methods
1.10.6 Maximum time from start-up to IIN 1.4 assertion (ms):	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: it depends of the MainTask interval and the number of I/O modules. But is guaranteed that after startup, the first message will have set bit "Need Time".		
1.10.7 Maximum Event Time-tag error for local Binary and Double-bit I/O (ms): *The error between the time-tag reported and the absolute time of the physical event. This error includes the Internal Time Reference Error.*	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: 1ms for value events when synchronized via IRIG-B. For quality events it depends of the MainTask interval and the number of I/O modules.		
1.10.8 Maximum Event Time-tag error for local I/O other than Binary and Double-bit data types (ms):	☐ Fixed at ms ☐ Range to ms ☐ Selectable from ms ■ Other, describe: I/O module scanning time, plus one MainTask interval, for value events. For quality events it depends of the MainTask interval and the number of I/O modules.		

[1] See performance section in user manual.

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):		

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.1 DNP3 device support for secure authentication: *The support for secure authentication is optional in DNP3 devices. Indicate here if the device supports secure authentication.* *If the device does not support secure authentication then ignore the rest of this section.* *If the device does support secure authentication then specify the version(s) that are supported in the device. The version number is an integer value defined in the protocol document "DNP3Spec-V2-Sup1-SecureAuthentication". The volume 2 supplement shows version numbers of all associated documents that comprise that version of Secure Authentication.*	■ Secure Authentication not supported If Secure Authentication is supported, what Version(s) are supported: ☐ Fixed at ☐ Configurable, selectable from versions		
1.12.2 Maximum number of users: *The secure authentication algorithm provides support for multiple users. The device must support details for each user (update keys, session keys, etc). A user is identified by a 16-bit user number, allowing a maximum of 65535 users. Devices are not mandated to support this number of potential users. Indicate here the actual limit to the number of simultaneous users that can be supported.*	Maximum number of users supported:		
1.12.3 Security message response timeout: *Authentication of critical messages may involve additional message exchanges (challenges and responses) which can require an extension to the normal DNP3 message response timeout. This timeout specifies an additional time to be used when the extra security transactions are involved. The maximum allowable timeout extension should not exceed 120 seconds.*	☐ Fixed at ms ☐ Configurable, range to ☐ Configurable, selectable from ms ☐ Other, explain:		

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.4 Aggressive mode of operation (receive): *DNP3 devices may (optionally) accept "aggressive" mode requests, where challenge data used for authentication is appended to a critical message rather than needing to be solicited via a separate message exchange.*		● *No – Does not* accept aggressive mode requests	
1.12.5 Aggressive mode of operation (issuing): *DNP3 devices must support the issuing of "aggressive" mode of operation, where challenge data used for authentication is appended to a critical message rather than needing to be solicited via a separate message exchange. Specific instances of devices may have the use of aggressive mode switched off.*		● *No – Does not* issue aggressive mode requests	
1.12.6 Session Key change interval: *To counter an attack that compromises the session key, the session key is changed at regular intervals. The maximum interval is 2 hours. Outstation devices invalidate the current set of session keys if they have not been changed by the master station after a period of twice this configured value.* *To accommodate systems with infrequent communications, this change interval can be disabled and just the session key change message count used (see 1.12.7)*	☐ Can be disabled When enabled: ☐ Configurable, range to seconds		
1.12.7 Session Key change message count: *In addition to changing the session key at regular intervals, the key shall also be changed after a specified number of messages have been exchanged. The maximum allowable value for this message count is 10,000*	☐ Configurable, range to		

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.8 Maximum error count: *To assist in countering denial of service attacks, a DNP3 device shall stop replying with error codes after a number of successive authentication failures. This error count has a maximum value of 10. Setting the error count to zero inhibits all error messages.*	☐ Configurable, range to		
1.12.9 HMAC algorithm requested in a challenge exchange: *Part of the authentication message is hashed using an MAC algorithm. DNP3 devices must support SHA-1 and may optionally support SHA-256 for this hashing process. The output of the MAC algorithm is truncated (the resulting length dependant on the media being used).*	☐ SHA-1 (truncated to 4 octets) ☐ SHA-1 (truncated to 10 octets) ☐ SHA-256 (truncated to 8 octets) ☐ SHA-256 (truncated to 16 octets) ☐ Other, explain:		
1.12.10 Key-wrap algorithm to encrypt session keys: *During the update of a session key, the key is encrypted using AES-128 or optionally using other algorithms.*	☐ AES-128 ☐ Other, explain:		
1.12.11 Cipher Suites used with DNP implementations using TLS: *Indicate the supported Cipher Suites for implementations using TLS.*	☐ Not relevant – TLS is not used ☐ TLS_RSA encrypted with RC4_128 ☐ TLS_RSA encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with DSS, encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with RSA, encrypted with 3DES_EDE_CBC ☐ TLS_DHE, signed with DSS, encrypted with 3DES_EDE_CBC ☐ TLS_DHE, signed with RSA, encrypted with 3DES_EDE_CBC ☐ TLS_DH, signed with DSS, encrypted with AES128 ☐ TLS_DH, signed with DSS, encrypted with AES256 ☐ TLS_DH encrypted with AES128 ☐ TLS_DH encrypted with AES256 ☐ Other, explain:		

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.12 Change cipher request timeout: *Implementations using TLS shall terminate the connection if a response to a change cipher request is not seen within this timeout period.*	☐ Not relevant – TLS is not used ☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:		
1.12.13 Number of Certificate Authorities supported: *Implementations using TLS shall support at least 4 Certificate Authorities. Indicate the number supported.*			
1.12.14 Certificate Revocation check time: *Implementations using TLS shall evaluate Certificate Revocation Lists on a periodic basis, terminating a connection if a certificate is revoked.*	☐ Not relevant – TLS is not used ☐ Fixed at hours ☐ Configurable, range to hours ☐ Configurable, selectable from hours ☐ Other, explain:		
1.12.15 Additional critical function codes: *The DNP3 specification defines those messages with specific function codes that are critical and must be used as part of a secure authentication message exchange. Messages with other function codes are optional and changes to this list should be noted here.*	Additional function codes that are to be considered as "critical": ☐ 0 (Confirm) ☐ 1 (Read) ☐ 7 (Immediate freeze) ☐ 8 (Immediate freeze – no ack) ☐ 9 (Freeze-and-clear) ☐ 10 (Freeze-and-clear – no ack) ☐ 11 (Freeze-at-time) ☐ 12 (Freeze-at-time – no ack) ☐ 22 (Assign Class) ☐ 23 (Delay Measurement) ☐ 25 (Open File) – V2 only ☐ 26 (Close File) – V2 only ☐ 27 (Delete File) – V2 only ☐ 28 (Get File Info) – V2 only ☐ 30 (Abort File) – V2 only ☐ 129 (Response) ☐ 130 (Unsolicited Response)		

1.12 SECURITY PARAMETERS	Capabilities	Current Value	If configurable, list methods
1.12.16 Other critical fragments: *Other critical transactions can be defined and should be detailed here. Examples could be based on time (for example: the first transaction after a communications session is established). Other examples could be based on specific data objects (for example: the reading of specific data points).*			

2 CAPABILITIES AND CURRENT SETTINGS FOR DEVICE DATABASE (OUTSTATIONS ONLY)

The following tables identify the capabilities and current settings for each DNP3 data type. Details defining the data points available in the device are shown in part 5 of this Device Profile.

2.1 BINARY INPUT POINTS-BIT INPUT POINTS

Static (Steady-State) Object Number: 1

Event Object Number: 2

	Capabilities	Current Value	If configurable, list methods
2.1.1 Static Variation reported when variation 0 requested:	■ Variation 1 – Single-bit Packed format ■ Variation 2 – Single-bit with flag ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.1.2 Event Variation reported when variation 0 requested:	■ Variation 1 – without time ■ Variation 2 – with absolute time ■ Variation 3 – with relative time ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.1.3 Event reporting mode: *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.*	☐ Only most recent ■ All events	All Events	
2.1.4 Binary Inputs included in Class 0 response: *If Binary Inputs are not included in the Class 0 response, Binary Input Events (group 2) may not be reported.*	■ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)	Always	

2.2 DOUBLE-BIT INPUT POINTS

Static (Steady-State) Object Number: 3

Event Object Number: 4

	Capabilities	Current Value	If configurable, list methods
2.2.1 Static Variation reported when variation 0 requested: .	■ Variation 1 – Double-bit Packed format ■ Variation 2 – Double-bit with flag ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.2.2 Event Variation reported when variation 0 requested:	■ Variation 1 – without time ■ Variation 2 – with absolute time ■ Variation 3 – with relative time ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.2.3 Event reporting mode: *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.*	☐ Only most recent ■ All events	All Events	
2.2.4 Double-bit Inputs included in Class 0 response: *If Double-bit Inputs are not included in the Class 0 response, Double-bit Input Events (group 4) may not be reported.*	■ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)	Always	

2.3 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	If configurable, list methods
2.3.1 Minimum pulse time allowed with Trip, Close, and Pulse On commands:	☐ Fixed at ms (hardware may limit this further) ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.3.2 Maximum pulse time allowed with Trip, Close, and Pulse On commands:	☐ Fixed at ms (hardware may limit this further) ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.3.3 Binary Output Status included in Class 0 response: *If Binary Output Status points are not included in the Class 0 response, Binary Output Status Events (group 11) may not be reported.*	☐ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.3.4 Reports Output Command Event Objects:	■ Never ☐ Only upon a successful Control ☐ Upon all control attempts		
2.3.5 Static Variation reported when variation 0 requested:	■ Variation 1 – Binary Output packed format ■ Variation 2 – Binary Output with flag ■ Based on point Index	Based on point Index	Software MasterTool Xtorm

2.3 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	If configurable, list methods
2.3.6 Event Variation reported when variation 0 requested: *Note: The support for binary output events can be determined remotely using protocol object Group 0 Variation 222.*	☐ Variation 1 – without time ☐ Variation 2 – with absolute time ☐ Based on point Index (add column to table below)		
2.3.7 Command Event Variation reported when variation 0 requested:	☐ Variation 1 – without time ☐ Variation 2 – with absolute time ☐ Based on point Index (add column to table below)		
2.3.8 Event reporting mode: *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 most recent ☐ All events		

2.3.9 Command Event reporting mode: *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 most recent ☐ All events		
2.3.10 Maximum Time between Select and Operate:	☐ Not Applicable ☐ Fixed at _____ seconds ■ Configurable, range 1 to 86400 seconds ☐ Configurable, selectable from seconds ☐ Configurable, other, describe ☐ Variable, explain ☐ Based on point Index	5	Software MasterTool Xtorm

2.4 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
2.4.1 Static Counter Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ■ Variation 5 – 32-bit without flag ■ Variation 6 – 16-bit without flag ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.4.2 Counter Event Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ■ Variation 5 – 32-bit with flag and time ■ Variation 6 – 16-bit with flag and time ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.4.3 Counters included in Class 0 response: *If Counters are not included in the Class 0 response, Counter Events (group 22) may not be reported.*	■ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)	Always	
2.4.4 Counter Event reporting mode: *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 Counters. When reporting* *only the most recent event the counter value returned in the response may be either the value at the time that the event is queued or it may be the value at the time of the response.*	☐ A: Only most recent (value at time of event) ☐ B: Only most recent (value at time of response) ■ C: All events ☐ Based on point index (see tables in part 5)	All events	

2.4 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
2.4.5 Static Frozen Counter Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ☐ Variation 5 – 32-bit with flag and time ☐ Variation 6 – 16-bit with flag and time ■ Variation 9 – 32-bit without flag ■ Variation 10 – 16-bit without flag ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.4.6 Frozen Counter Event Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ■ Variation 5 – 32-bit with flag and time ■ Variation 6 – 16-bit with flag and time ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.4.7 Frozen Counters included in Class 0 response: *If Frozen Counters are not included in the Class 0 response, Frozen Counter Events (group 23) may not be reported.*	■ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)	Always	
2.4.8 Frozen Counter Event reporting mode: *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.*	☐ Only most recent frozen value ■ All frozen values index	All frozen values	

2.4 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
2.4.9 Counters Roll Over at:	■ 16 Bits (65,535) ■ 32 Bits (4,294,967,295) ☐ Fixed at ☐ Configurable; range to ☐ Configurable, selectable from ☐ Other, explain: ☐ Based on point index (see tables in part 5)		
2.4.10 Counters frozen by means of:	■ Master Request ☐ Freezes itself without concern for time of day ☐ Freezes itself and requires time of day ☐ Other, explain:		

2.5 ANALOG INPUT POINTS

Static (Steady-State) Object Number: 30
Event Object Number: 32
Deadband Object Number: 34

	Capabilities	Current Value	If configurable, list methods
2.5.1 Static Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ■ Variation 3 – 32-bit without flag ■ Variation 4 – 16-bit without flag ■ Variation 5 – single-precision floating point with flag ☐ Variation 6 – double-precision floating point with flag ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.5.2 Event Variation reported when variation 0 requested:	■ Variation 1 – 32-bit without time ■ Variation 2 – 16-bit without time ■ Variation 3 – 32-bit with time ■ Variation 4 – 16-bit with time ■ Variation 5 – single-precision floating point w/o time ☐ Variation 6 – double-precision floating point w/o time ■ Variation 7 – single-precision floating point with time ☐ Variation 8 – double-precision floating point with time ■ Based on point index (see tables in part 5)	Based on point index(see tables in part 5)	Software MasterTool Xtorm
2.5.3 Event reporting mode: *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. When reporting only the most recent event the analog value returned in the response may be either the value at the time that the event is queued or it may be the value at the time of the response.*	■ A: Only most recent (value at time of event) ☐ B: Only most recent (value at time of response) ■ C: All events ☐ Based on point index (see tables in part 5)	All events	

2.5 ANALOG INPUT POINTS

Static (Steady-State) Object Number: 30
Event Object Number: 32
Deadband Object Number: 34

	Capabilities	Current Value	If configurable, list methods
2.5.4 Analog Inputs Included in Class 0 response: *If Analog Inputs are not included in the Class 0 response, Analog Input Events (group 32) may not be reported.*	■ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)	Always	
2.5.5 How Deadbands are set:	☐ A. Global Fixed ☐ B. Configurable through DNP ■ C. Configurable via other means ☐ D. Other, explain: ■ Based on point index - (see tables in part 5)	C. Configurable via other means	Software MasterTool Xtorm
2.5.6 Analog Deadband Algorithm: *absolute - just compares the difference from the previous reported value* *integrated - keeps track of the accumulated change*	■ Absolute ■ Integrated ■ Disabled: The variation of one unit is sufficient to generate an event. ☐ Based on point index.(see tables in part 5)	Disabled	Software MasterTool Xtorm

2.5 ANALOG INPUT POINTS

Static (Steady-State) Object Number: 30
Event Object Number: 32
Deadband Object Number: 34

	Capabilities	Current Value	If configurable, list methods
2.5.7 Static Frozen Analog Input Variation reported when variation 0 requested:	☐ Variation 1 – 32-bit with flag ☐ Variation 2 – 16-bit with flag ☐ Variation 3 – 32-bit with time-of-freeze ☐ Variation 4 – 16-bit with time-of-freeze ☐ Variation 5 – 32-bit without flag ☐ Variation 6 – 16-bit without flag ☐ Variation 7 – single-precision floating point with flag ☐ Variation 8 – double-precision floating point with flag ☐ Based on point index (see tables in part 5)		
2.5.8 Frozen Analog Input Event Variation reported when variation 0 requested:	☐ Variation 1 – 32-bit without time ☐ Variation 2 – 16-bit without time ☐ Variation 3 – 32-bit with time ☐ Variation 4 – 16-bit with time ☐ Variation 5 – single-precision, floating-point without time ☐ Variation 6 – double-precision, floating-point w/o time ☐ Variation 7 – single-precision, floating-point with time ☐ Variation 8 – double-precision, floating-point with time ☐ Based on point index (see tables in part 5)		

2.5 ANALOG INPUT POINTS

Static (Steady-State) Object Number: 30
Event Object Number: 32
Deadband Object Number: 34

	Capabilities	Current Value	If configurable, list methods
2.5.9 Frozen Analog Inputs included in Class 0 response: *FFrozen Analog Inputs are not included in the Class 0 response, Frozen Analog Input Events (group 33) may not be reported.*	☐ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)		
2.5.10 Frozen Analog Input Event reporting mode: *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 Analog Inputs.*	☐ Only most recent frozen value ☐ All frozen values		

2.6 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
2.6.1 Static Analog Output Status Variation reported when variation 0 requested:	■ Variation 1 – 32-bit with flag ■ Variation 2 – 16-bit with flag ■ Variation 3 – single-precision floating point with flag ☐ Variation 4 – double-precision floating point with flag ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.6.2 Analog Output Status Included in Class 0 response: *If Analog Output Status points are not included in the Class 0 response, Analog Output Events (group 42) may not be reported.*	☐ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ■ Based on point index (see tables in part 5)	Based on point index (see tables in part 5)	Software MasterTool Xtorm
2.6.3 Reports Output Command Event Objects:	■ Never ☐ Only upon a successful Control ☐ Upon all control attempts		
2.6.4 Event Variation reported when variation 0 requested:	☐ Variation 1 – 32-bit without time ☐ Variation 2 – 16-bit without time ☐ Variation 3 – 32-bit with time ☐ Variation 4 – 16-bit with time ☐ Variation 5 – single-precision floating point w/o time ☐ Variation 6 – double-precision floating point w/o time ☐ Variation 7 – single-precision floating point with time ☐ Variation 8 – double-precision floating point with time ☐ Based on point index (see tables in part 5)		

2.6 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
2.6.5 Command Event Variation reported when variation 0 requested:	☐ Variation 1 – 32-bit without time ☐ Variation 2 – 16-bit without time ☐ Variation 3 – 32-bit with time ☐ Variation 4 – 16-bit with time ☐ Variation 5 – single-precision floating point w/o time ☐ Variation 6 – double-precision floating point w/o time ☐ Variation 7 – single-precision floating point with time ☐ Variation 8 – double-precision floating point with time ☐ Based on point index (see tables in part 5)		
2.6.6 Change Event reporting mode: *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 most recent ☐ All events		
2.6.7 Command Event reporting mode: *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 most recent ☐ All events		

2.6 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
2.6.8 Maximum Time between Select and Operate:	☐ Not Applicable ☐ Fixed at seconds ■ Configurable, range 1 to 86400 seconds ☐ Configurable, selectable from seconds ☐ Other, explain: ☐ Variable, explain: ☐ Based on point index (see tables in part 5)	1	Software MasterTool Xtorm

2.7 SEQUENTIAL FILE TRANSFER

Object Number: 70

	Capabilities	Current Value	If configurable, list methods
2.7.1 File Transfer Supported:	☐ Yes ■ No	No	
2.7.2 File Authentication: *Indicates whether a valid authentication key must be obtained prior to open and delete requests.*	☐ Always ☐ Sometimes, explain☐ Never		
2.7.3 File Append Mode: *Indicates if a file can be opened and appended to versus just overwritten.*	☐ Always ☐ Sometimes, explain☐ Never		
2.7.4 Permissions Support: *Indicates the device is capable of using the indicated permissions.*	☐ Owner Read Allowed: 0x0100 ☐ Owner Write Allowed: 0x0080 ☐ Owner Execute Allowed: 0x0040 ☐ Group Read Allowed: 0x0020 ☐ Group Write Allowed: 0x0010 ☐ Group Execute Allowed: 0x0008 ☐ World Read Allowed: 0x0004 ☐ World Write Allowed: 0x0002 ☐ World Execute Allowed: 0x0001		
2.7.5 Multiple Blocks in a Fragment: *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.*	☐ Yes ☐ No		
2.7.6 Max number of Files Open at one time:	☐ Fixed at ☐ Configurable, range to ☐ Configurable, selectable from ☐ Other, explain:		

2.8 OCTET STRING POINTS

Static (Steady-State) Object Number: **110**
Event Object Number: **111**

	Capabilities	Current Value	If configurable, list methods
2.8.1 Event reporting mode: *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 most recent ☐ All events		
2.8.2 Octet Strings Included in Class 0 response: *If Octet Strings are not included in the Class 0 response, Octet String Events (group 111) may not be reported.*	☐ Always ☐ Never ☐ Only if point is assigned to Class 1, 2, or 3 ☐ Based on point index (see tables in part 5)		

3 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 must be parsed by an Outstation.

DNP OBJECT GROUP & VARIATION			REQUEST Master may issue Outstation must parse		RESPONSE Master must parse Outstation may issue	
Object Group Number	**Variation Number**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
1	0	Binary Input - any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all)		
1	1	Binary Input – Single-bit packed	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
1	2	Binary Input - Single-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
2	0	Binary Input Change Event - any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
2	1	Binary Input Change Event - without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	2	Binary Input Change Event - with absolute time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	3	Binary Input Change Event - with relative time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
3	0	Double-bit Input – any Variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all)		
3	1	Double-bit Input – Double-bit packed	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
3	2	Double-bit Input - with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
4	0	Double-bit Input Change Event - any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
4	1	Double-bit Input Change Event - without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
4	2	Double-bit Input Change Event - with absolute time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 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) 130 (unsol. resp)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST Master may issue Outstation must parse		RESPONSE Master must parse Outstation may issue	
Object Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
10	0	Binary Output - any variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
10	1	Binary Output – packed format	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
10	2	Continuous Control-output status with flags	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
12	1	Binary Output Command (CROB)- any variation	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	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	00, 01 (start-stop) 06 (no range, or all)		
20	1	Counter - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	2	Counter - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	5	Counter - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
20	6	Counter - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	0	Frozen Counter - any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all)		
21	1	Frozen Counter - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	2	Frozen Counter - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	9	Frozen Counter - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
21	10	Frozen Counter - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
22	0	Counter Change Event - Any Variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
22	1	Counter Change Event - 32-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	2	Counter Change Event - 16-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	5	Counter Change Event - 32-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
22	6	Counter Change Event - 16-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST Master may issue Outstation must parse		RESPONSE Master must parse Outstation may issue	
Object Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
23	0	Frozen Counter Change Event – any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
23	1	Frozen Counter Change Event - 32-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. Resp)	17,28 (index)
23	2	Frozen Counter Change Event - 16-bit with flag	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17,28 (index)
23	5	Frozen Counter Change Event - 32-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
23	6	Frozen Counter Change Event - 16-bit with flag and time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
30	0	Analog Input - any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all)		
30	1	Analog Input - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	2	Analog Input - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	3	Analog Input - 32-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	4	Analog Input - 16-bit without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
30	5	Analog Input - single-precision, floating-point with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all))	129 (response)	00, 01 (start-stop)
32	0	Analog Input Change Event - any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1	Analog Input Change Event - 32-bit without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	Analog Input Change Event - 16-bit without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	3	Analog Input Change Event - 32-bit with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	4	Analog Input Change Event - 16-bit with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	5	Analog Input Change Event - single-precision floating-point without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	7	Analog Input Change Event - Single-precision,floating-point with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
40	0	Analog Output Status – any variation	1 (read)	00, 01 (start-stop) 06 (no range, or all)		
40	1	Analog Output Status - 32-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)

DNP OBJECT GROUP & VARIATION			REQUEST Master may issue Outstation must parse		RESPONSE Master must parse Outstation may issue	
Object Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
40	2	Analog Output Status - 16-bit with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
40	3	Analog Output Status - single-precision, floating-point with flag	1 (read)	00, 01 (start-stop) 06 (no range, or all)	129 (response)	00, 01 (start-stop)
41	1	Analog Output Block - 32-bit	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
41	2	Analog Output Block - 16-bit	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
41	3	Analog Output Block - single-precision, floating-point	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
50	1	Time and Date – absolute time	1 (read)	07, (limited qty = 1)	129 (response)	07 (limited qty = 1)
			2 (write)	07 (limited qty = 1)		
50	3	Time and Date – absolute time at last recorded time	2 (write)	07 (limited qty)		
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)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
60	3	Class Objects - class 2 data	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 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)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
80	1	Internal Indications – packed format	1 (read)	00, 01 (start-stop)	129 (response)	00, 01 (start-stop)
			2 (write)	00 (start-stop)		

DNP OBJECT GROUP & VARIATION			REQUEST Master may issue Outstation must parse		RESPONSE Master must parse Outstation may issue	
Object Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
No Object (function code only)			13 (cold restart)			
No Object (function code only)			23 (delay meas.)			
No Object (function code only)			24 (record current time)			

4 DATA POINTS LIST

This part of the Device Profile shows how to generate and obtain a list with the data points available in the outstation device, since the device is configurable by the user and has no fixed data points.

To generate the list of data points, which is not static, user has to use the HD8500 tool, the same one used to configure and program the device. The tool provides an option to export the data point list to CSV (comma-separated values) files. User can obtain the data point list of the whole RTU as well as the data points mapped for all clients or for a specific one. These two ways to generate the list are explained below.

The first way is generating the CSV file of the whole RTU, and these steps are necessary to be followed to generate the list of data points:

- Open the RTU project with HD8500 using the menu option File / Open Project;
- With the project opened select the menu option Project / Export to CSV;
- Choose the path and file name and save the information into the file;
- Open the CSV file where it was saved, using the MS Excel or a Text editor like Notepad;
- The points are showed below the identification #DnpServerClientMapping.

The second way is generating the CSV file of a data set. In this case the user can choose between a data set from a specific Client or from the Server. Exporting a specific Server the user will obtain the data point list from all Clients mapped in the Server. The following steps are necessary to generate the list of data points:

- Open the RTU project with HD8500 using the menu option File / Open Project;
- With the project opened, select the desired DNP3 object on the device treeview;
- Click the mouse right button and select the option Export to CSV;
- Choose the path and file name and save the information into the file;
- Open the CSV file where it was saved, using the MS Excel or a Text editor like Notepad;
- The points are showed below the identification #DnpServerClientMapping.