General Specifications

DNP3 Communication Portfolio (FCN-500/FCN-RTU)

GS 34P02P22-02E

■ GENERAL

This General Specifications document describes the Distributed Network Protocol (DNP3) Communication Portfolio for STARDOM. The DNP3 Communication Portfolio generates a control application for FCN-500, FCN-RTU autonomous controllers. Using this portfolio, the FCN-500, FCN-RTU can perform DNP3 communication via a serial port or Ethernet port.

Notation in this document:
- The term “FCN” refers to the module consisting type autonomous controllers.
- The term “FCN-500” refers to the autonomous controllers with NFCP501/NFCP502 CPU module.
- The term “FCN-RTU” refers to the low power autonomous controllers with NFCP050 CPU module.

■ OPERATING ENVIRONMENT

● FCN-500

Communication type		Communication port
Serial communication	RS-232-C	CPU module (NFCP501, NFCP502) Serial port (*1)
		Serial communication module (NFLR111) Serial port
	RS-422/RS-485	Serial communication module (NFLR121) Serial port
Ethernet communication		CPU module (NFCP501, NFCP502) Ethernet port

*1: In a CPU duplex configuration, the CPU module serial port cannot be used.

● FCN-RTU

Communication type		Communication port
Serial communication	RS-232	CPU module (NFCP050) Serial port
	RS-422/RS-485	CPU module (NFCP050) Serial port
Ethernet communication		CPU module (NFCP050) Ethernet port

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■ FUNCTION SPECIFICATIONS

● DNP3 Communication Portfolio

DNP3 Communication Portfolio is a POU that enables DNP3 communication protocol support devices to easily acquire data from FCN-500 and FCN-RTU autonomous controllers via serial communication or Ethernet communication. The following communication functions are supported:

Communication type (*3) (*4)	Communication function
Serial communication (*1)	Slave Up to two ports can be communicated
Ethernet communication (*2)	Server Up to two client can be connected

*1: Serial communication is possible only when the FCN-500 and FCN-RTU operates as a slave.
*2: FCN-500 and FCN-RTU operates as a server.
*3: Only one of these communications can be used.
*4: In a CPU duplex configuration, all change events will be reset at CPU switch-over.

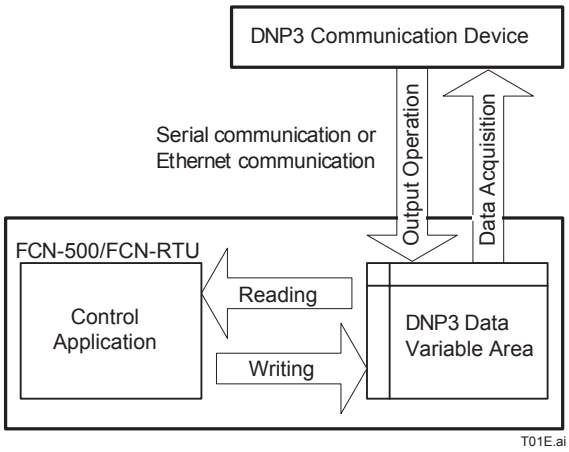

Figure DNP3 Data Access

■ ACCESSIBLE RANGE

The accessible device ranges, between the DNP3 communication device and FCN-500 and FCN-RTU, are shown in the table below:

● SD_CDNP_SS_ASSIGN POU

Data type	IEC data type	Index range
Binary Input	BOOL	0 to 499
Binary Output	BOOL	0 to 499
32-Bit Binary Counter	UDINT	0 to 499
32-Bit Analog Input	DINT	0 to 499 (*1)
Single-Precision Floating Point Analog Input	REAL	
32-Bit Analog Output	DINT	0 to 499 (*1)
Single-Precision Floating Point Analog Output	REAL	

1*: One of “32-Bit Analog Input/Output”(DINT) or “Single-Precision Floating Point Analog Input/Output”(REAL) can be selected by the parameter “ANLG_TYPE” of the DNP3 data variable area assigning POU ”SD_CDNP_SS_ASSIGN”.

● SD_CDNP_SS_ASSIGN2 POU

Data type	IEC data type	Index range (*4)
Binary Input	BOOL	0 to 499
Binary Output	BOOL	0 to 499
16-Bit Binary Counter	UINT	0 to 499 (*1)
32-Bit Binary Counter	UDINT	
16-Bit Frozen Counter	UINT	0 to 499 (*1)
32-Bit Frozen Counter	UDINT	
16-Bit Analog Input	INT	0 to 499 (*2)
32-Bit Analog Input	DINT	
Single-Precision Floating Point Analog Input	REAL	
Double-Precision Floating Point Analog Input	LREAL	
16-Bit Analog Output	INT	0 to 499 (*2)
32-Bit Analog Output	DINT	
Single-Precision Floating Point Analog Output	REAL	
Double-Precision Floating Point Analog Output	LREAL	
32-Octet Strings (*3)	STRINGS32	0 to 29

*1: “16-Bit Binary Counter”(UINT) and “32-Bit Binary Counter”(UDINT) can be configured by the parameters “CT16_OFFSET” and “CT32_OFFSET” of the DNP3 data variable area assigning with detail data types POU “SD_CDNP_SS_ASSIGN2”.

*2: “16-Bit Analog Input/Output”(INT), “32-Bit Analog Input/Output”(DINT), “Single-Precision Floating Point Analog Input/Output”(REAL) and “Double-Precision Floating Point Analog Input/Output”(LREAL) can be configured by the parameters “AI16_OFFSET”, “AI32_OFFSET”, “AISF_OFFSET”, “AIDF_OFFSET”, “AO16_OFFSET”, “AO32_OFFSET”, “AOSF_OFFSET” and “AODF_OFFSET” of the DNP3 data variable area assigning with detail data types POU “SD_CDNP_SS_ASSIGN2”.

*3: The maximum length of “Octet String” is 32 octets.

*4: Maximum index number can be configured by the parameters “BI_MAX_INDEX”, “AI_MAX_INDEX”, “BO_MAX_INDEX”, “AO_MAX_INDEX”, and “CT_MAX_INDEX” of the DNP3 data variable area assigning with detail data types POU “SD_CDNP_SS_ASSIGN2”.
The index range for “Class 0 Poll” or “Integrity Poll” needs to be limited by specifying each data type’s maximum index number.

■ LIST OF POU FUNCTIONS

● DNP3 Communicaton POU

The table below presents POUs that are defined to start DNP3 communication:

POU name	Function
SD_CDNP_SS_ASSIGN	Assigning data variables to a specific memory
SD_CDNP_SS_ASSIGN2	Assigning data variables to a specific memory with detail data types
SD_CDNP_SS_RS_ OPEN	Starting DNP3 communication task for serial communication
SD_CDNP_SS_TCP_ OPEN	Starting DNP3 communication task for Ethernet communication

● Data Attribute POU

The table below presents POUs that are defined to assign attributes for individual data variables:

POU name	Function
SD_CDNP_S_EVTC	Assigning event class
SD_CDNP_S_DBND	Setting analog input deadband value
SD_CDNP_S_DBND_AO_LOCAL	Setting analog output local operation deadband value
SD_CDNP_S_CROB	Setting binary output operation attribute
SD_CDNP_S_RANGE_AIO16	Setting 16-bit analog input/output range
SD_CDNP_S_RANGE_AIO32	Setting 32-bit analog input/output range
SD_CDNP_S_RANGE_AIOSF	Setting single-precision floating point analog input/output range
SD_CDNP_S_RANGE_AIODF	Setting double-precision floating point analog input/output range

● Command Execution POU

POU name	Function
SD_CDNP_S_CROB_PULSE	Executing binary output pulse model command operation

● Time Stamped Data Storing POU

POU name	Function
SD_CDNP_S_BI_WT_TS	Storing binary input time stamped data
SD_CDNP_S_CT16_WT_TS	Storing 16-bit binary counter time stamped data
SD_CDNP_S_CT32_WT_TS	Storing 32-bit binary counter time stamped data
SD_CDNP_S_AI16_WT_TS	Storing 16-bit analog input time stamped data
SD_CDNP_S_AI32_WT_TS	Storing 32-bit analog input time stamped data
SD_CDNP_S_AISF_WT_TS	Storing single-precision floating point analog input time stamped data
SD_CDNP_S_AIDF_WT_TS	Storing double-precision floating point analog input time stamped data

● Data Access POU

The table below presents POUs that are used to access various data variables:

POU name	Function
SD_CDNP_S_BI_RD	Reading binary input data
SD_CDNP_S_BO_RD	Reading binary output data
SD_CDNP_S_CT16_RD	Reading 16-bit binary counter data
SD_CDNP_S_CT32_RD	Reading 32-bit binary counter data
SD_CDNP_S_AI16_RD	Reading 16-bit analog input data
SD_CDNP_S_AI32_RD	Reading 32-bit analog input data
SD_CDNP_S_AISF_RD	Reading single-precision floating point analog input data
SD_CDNP_S_AIDF_RD	Reading double-precision floating point analog input data
SD_CDNP_S_AO16_RD	Reading16-bit analog output data
SD_CDNP_S_AO32_RD	Reading 32-bit analog output data
SD_CDNP_S_AOSF_RD	Reading single-precision floating point analog output data
SD_CDNP_S_AODF_RD	Reading double-precision floating point analog output data
SD_CDNP_S_OSTR32_RD	Reading 32-octet string data
SD_CDNP_S_BI_WT	Writing binary input data
SD_CDNP_S_BO_WT	Writing binary output data
SD_CDNP_S_CT16_WT	Writing 16-bit binary counter data
SD_CDNP_S_CT32_WT	Writing 32-bit binary counter data
SD_CDNP_S_AI16_WT	Writing 16-bit analog input data
SD_CDNP_S_AI32_WT	Writing 32-bit analog input data
SD_CDNP_S_AISF_WT	Writing single-precision floating point analog input data
SD_CDNP_S_AIDF_WT	Writing double-precision floating point analog input data
SD_CDNP_S_AO16_WT	Writing 16-bit analog output data
SD_CDNP_S_AO32_WT	Writing 32-bit analog output data
SD_CDNP_S_AOSF_WT	Writing single-precision floating point analog output data
SD_CDNP_S_AODF_WT	Writing double-precision floating point analog output data
SD_DCNP_S_OSTR32_WT	Writing 32-octet string data
SD_CDNP_S_BI_WT_F	Writing binary input data with flags
SD_CDNP_S_BO_WT_F	Writing binary output data with flags
SD_CDNP_S_CT16_WT_F	Writing 16-bit binary counter data with flags
SD_CDNP_S_CT32_WT_F	Writing 32-bit binary counter data with flags
SD_CDNP_S_AI16_WT_F	Writing 16-bit analog input data with flags
SD_CDNP_S_AI32_WT_F	Writing 32-bit analog input data with flags
SD_CDNP_S_AISF_WT_F	Writing single-precision floating point analog input data with flags
SD_CDNP_S_AIDF_WT_F	Writing double-precision floating point analog input data with flags
SD_CDNP_S_AO16_WT_F	Writing 16-bit analog output data with flags
SD_CDNP_S_AO32_WT_F	Writing 32-bit analog output data with flags
SD_CDNP_S_AOSF_WT_F	Writing single-precision floating point analog output data with flags
SD_CDNP_S_AODF_WT _F	Writing double-precision floating point analog output data with flags

■ DNP3 FIELD DEVICE PROFILE

●Device Properties

DEVICE IDENTIFICATION	
Device Function:	● Outstation (as Serial Communication Slave & TCP Server station)
Vendor Name:	Yokogawa Electric Corporation
Device Name:	STARDOM FCN/FCJ
Device manufacturer's hardware version string:	DNP Group 0 - Attribute Objects are Not Supported. Following information can be confirmed by Resource Configurator “CPU Module Configuration” - “RAS Information” - Controller Model Name, Hardware Serial Number, Manufacturing Year and Month - Os Revision, Boot Program Revision/Build Number, Basic Software Revision/Build Number
Device manufacturer's software version string:	
Device Profile Document Version Number:	2016
DNP Levels Supported for:	Outstations Only Requests and Responses ☒ None - partially supported ☒ Level 1 ☒ Level 2 - except Device Attributes (Device Attributes will be configured by Logic Designer) ☒ Level 3 - except Device Attributes (Device Attributes will be configured by Logic Designer) ☒ Level 4 - partially supported
Supported Function Blocks:	☐ Self-Address Support ☐ Data Sets ☐ File Transfer ☐ Virtual Terminal ☐ Mapping to IEC 61850 Object Models defined in a DNP3 XML file. ☐ Function code 31, activate configuration ☐ Authentication (if checked then see “SECURITY PARAMETERS”)
Notable Additions:	- Serial and TCP connection can be used. - Up to two connections can be used. - Event buffer size can be expanded up to 135,000 events. - Every data types (BOOL/UINT/UDINT/INT/DINT/REAL/LREAL/STR32) can be used. - Pulse output operation can be operated. - Unsolicited response can be sent.
Methods to set Configurable Parameters:	☒ Software - Vender software named “Logic Designer” and “Resource Configurator” ☒ Protocol - Set via DNP3 (e.g. assign class, write deadband)
DNP3 XML Files Available On-line:	☒ None
External DNP3 XML Files Available Off-line:	☒ None
Connections Supported:	Configurable, selectable from Serial, IP Networking - Configurable by Logic Designer ☒ Serial (complete section “SERIAL CONNECTIONS”) ☒ IP Networking (complete section “IP NETWORKING”)
Conformance Testing:	☒ Self-tested, version
SERIAL CONNECTIONS	
Port Name:	For COM Ports of CPU Modules ☒ Fixed at COM1/COM2/COM3/COM4
	For Serial Communication Modules ☒ Logical Port Name can be assigned by Resource Configurator
Serial Connection Parameters:	☒ Asynchronous - Data Bits: Selectable from 7, 8-bits (default = 8) - Start Bit: Fixed at 1-bit - Stop Bits: Selectable from 1, 2-bits (default = 1) - Parity: Selectable from NONE, EVEN, ODD (default = NONE)
	For COM Ports of CPU Modules - Configurable by STARDOM FCX Maintenance Page “COM Port Setting File”
	For Serial Communication Modules - Configurable by Resource Configurator

Baud Rate:	For COM Ports of CPU Modules ☒ Configurable, selectable from 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200 (default = 9600)
	For Serial Communication Modules ☒ Configurable, selectable from 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200 (default = 9600)
Hardware Flow Control (Handshaking):	RS-232 Options: for COM Ports of CPU Modules - Send Flow Control ☒ Configurable, select from NONE, CTS, DSR (default = NONE) - Receive Flow Control ☒ Configurable, select from NONE, RTS, DTR (default = NONE) - Send Validate ☒ Configurable, select from NONE, DSR (default = NONE) - Receive Validate ☒ Configurable, select from NONE, DSR, CD, DSR_CD (default = NONE) - Initial DTR state ☒ Configurable, select from ON, OFF (default = OFF)
	RS-232 Options: for Serial Communication Modules - Send Flow Control ☒ Fixed at CTS - Receive Flow Control ☒ Configurable, select from NONE, RTS (default = NONE) - Send Signal Check ☒ Configurable, select from NONE, DSR, CD, DSR_CD (default =NONE) - Receive Signal Check ☒ Fixed at CD - Initial DTR state ☒ Fixed at ON
Interval to Request Link Status:	☒ Not Supported
Supports DNP3 Collision Avoidance:	☒ Other, explain
	For RS-232-C Communication Modules and RS-232-C Serial Ports - “Full-duplex” or “Half-duplex with Hardware Flow Control” can be used.
	For RS-422 Communication Modules and RS-422 Serial Port of FCN-RTU CPU Modules - “4-wire” and “Full-duplex” should be configured.
Receiver Inter-Character Timeout:	- with the parameter “INTER_CHAR_TOUT” of “SD_CDNP_SS_RS_OPEN”
	For COM Ports of CPU Modules ☒ Configurable range 10.0 to 5000.0 (ms), in units of 10 (ms) (default = 10.0(ms)).
	For Serial Communication Modules ☒ Configurable range 1.5 to 100.0 (character time) (or 1.5 (character time) to 100000.0 (ms)) (default = 4.0 (character time)).
Unit of Receiver Inter-Character Timeout:	☒ Configurable, selectable from “Character Time” or “Millisecond” - with the parameter “UNIT_CHAR_TIM“ of “SD_CDNP_SS_RS_OPEN” “UNIT_CHAR_TIM”=TRUE: Character time is used as the unit of the timeout value (default) “UNIT_CHAR_TIM”=FALSE: Millisecond is used as the unit of the timeout value
Inter-Character Gaps in Transmission:	☒ None (always transmits with no inter-character gap)
Multiple Master Connections:	☒ Supports multiple masters (Up to two connections are possible)
IP NETWORKING	
Port Name:	
Type of End Point:	☒ TCP Listening
IP Address of this Device:	☒ Configurable by Resource Configurator “Set IP Address Dialog”
Subnet Mask:	
Gateway IP Address:	
TCP Connection Establishment:	☒ Allows all (when no IP address is listed in the “Packet Filter Setting File”) ☒ Limits based on list of IP address (when the IP addresses are listed in the “Packet Filter Setting File”)
IP Address of Remote Device:	☒ Configurable by STARDOM FCX Maintenance Page “Packet Filter Setting File”
TCP Listen Port Number:	☒ Configurable , range 0 to 65535 (default = 20000) - with the parameter “PORT_NO” of “SD_CDNP_SS_TOPEN” - When specify the TCP port number, check to ensure the number that has not been used for the other TCP ports by different communications. - Then, specify a reasonable port number, except zero. - When connecting to two clients, specify different number for each connection. - And without a conflict of TCP port number, 20050 can be the candidate of the second connection.
TCP Listen Port Number of Remote Device:	☒ Not Applicable (Outstation w/o dual end point)
TCP Keep-alive Timer:	☒ Timer disabled

TCP Timeout:	Instead of Keep-alive timer, TCP disconnection will be checked with this timeout value. ☒ Configurable by Logic Designer (range 5 to 3600 seconds) (default = 5 (sec)) - with the parameter “TIMEOUT” of “SD_CDNP_SS_TCP_OPEN” - Outstation will close the TCP socket, if no data is received from the Master within the time.
	Unsolicited NULL response can be sent periodically to keep the connection for the unsolicited responses. ☒ Configurable by Logic Designer - by the following bit of the parameter “OPTION” of “SD_CDNP_SS_TCP_OPEN” “OPTION”=DWORD#16#00000004: Keep TCP connection by sending unsolicited NULL response bit - If no message is received for a while, after “TIMEOUT” is over, an unsolicited NULL response will be sent. - Then, if a confirmation is received, TCP port connection will be kept, but if not, after “APPL_CNF_TOUT” is over, TCP port connection will be closed and re-opened to prepare the next re-connection.
TCP Response Delay Time:	☒ Configurable by Logic Designer (range 20 to 500 (ms)) (default = 20 (ms)) - with the parameter “DELAY” of “SD_CDNP_TCP_OPEN” - Outstation will take the delay interval time between each response message.
Local UDP Port:	☒ Not Supported
Destination UDP Port for Initial Unsolicited Responses:	
Destination UDP Port for Responses:	
Multiple Master Connections:	☒ Supports multiple masters (Up to two connections are possible) If supported, the following methods may be used: ☒ Method 2 (based on IP port number)
Time Synchronization Support:	☒ SNTP (Simple Network Time Protocol) - Configurable by STARDOM FCX Maintenance Page “SNTP Setting File”
	☒ DNP3 LAN procedure (function code 24) ☒ DNP3 Write Time (not recommended over LAN) - Configurable by Logic Designer - with the parameter “TIM_SYNC_REQ” of “SD_CDNP_RS_OPEN/TCP_OPEN” “TIM_SYNC_REQ”=FALSE: Time Synchronization is not required (default) “TIM_SYNC_REQ”=TRUE: Time Synchronization is required - DNP3 Network Method can be used when SNTP cannot be used.
When Does Outstation Set IIN1.4?	when DNP3 Network Method is not used (TIM_SYNC_REQ = FALSE) ☒ Never
	when DNP3 Network Method is used (TIM_SYNC_REQ = TRUE) ☒ Asserted at startup until first Time Synchronization request received ☒ Periodically, every 30 minutes after the last “Time Synchronization”
	- Refer to “Time Synchronization Support” at section “IP NETWORKING” for the detail.
LINK LAYER	
Data Link Address: (DNP3 Outstation Address)	☒ Configurable, range 0 to 0xffff - Configurable by Logic Designer - with the parameter “SRC_ADDR” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” “SRC_ADDR” (= DNP3 Outstation Address of STARDOM FCN/FCJ) - Data Link Address can be used for DNP3 Source Address Validation at the Master. - Specify the address in range from 0x0000 to 0xFFEF. - Addresses in the range 0xFFF0 through 0xFFFF are reserved by DNP3 for special use.
DNP3 Source Address Validation:	☒ Always, one address allowed - Outstation will filter out requests not from the Master.
DNP3 Source Address Expected When Validation is Enables: (DNP3 Master Address)	☒ Configurable to any 16 bit DNP Data Link Address value - Configurable by Logic Designer - with the parameter “DST_ADDR” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” “DST_ADDR” (= DNP3 Master Address to communicate with STARDOM FCN/FCJ) - DNP3 Source Address is used for DNP3 Source Address Validation at the Outstation.
Self Address Support Using Address 0xFFFC:	☒ No
Sends Confirmed User Data Frames:	☒ Never
Data Link Layer Confirmation Timeout:	☒ None
Maximum Data Link Retries:	☒ Never Retries

Maximum Number of Octets Transmitted in a Data Link Frame:	☒ Fixed at 292
Maximum Number of Octets that can be Received in a Data Link Frame:	☒ Fixed at 292
APPLICATION LAYER	
Maximum Number of Octets Transmitted in an Application Layer Fragment other than File Transfer.	☒ Fixed at 2048
Maximum Number of Octets Transmitted in an Application Layer Fragment containing File Transfer:	☒ File Transfer is Not Supported
Maximum Number of Octets that can be Received in an Application Layer Fragment :	☒ Fixed at 2048
Timeout Waiting for Complete Application Layer Fragment:	☒ Fixed at 15 seconds
Maximum Number of Objects Allowed in a Single Control Request for CROB:	☒ Fixed at 1(enter 0 if controls are not supported for CROB)
Maximum Number of Objects Allowed in a Single Control Request for Analog Outputs:	☒ Fixed at 1(enter 0 if controls are not supported for Analog Outputs)
Maximum Number of Objects Allowed in a Single Control Request for Data Sets:	☒ Not Supported
Supports Mixing Object Groups (AOBs, CROBs and Data Sets) in the Same Control Request:	☒ No
Control Status Codes Supported:	☒ 1 – TIMEOUT ☒ 2 – NO_SELECT ☒ 3 – FORMAT_ERROR ☒ 4 – NOT_SUPPORTED ☒ 5 – ALREADY_ACTIVE ☐ 6 – HARDWARE_ERROR ☐ 7 – LOCAL ☒ 8 – TOO_MANY_OBJS ☐ 9 – NOT_AUTHORIZED ☐ 10 – AUTOMATION_INHIBIT ☐ 11 – PROCESSING_LIMITED ☐ 12 – OUT_OF_RANGE ☐ 13 – DOWNSTREAM_LOCAL ☐ 14 – ALREADY_COMPLETE ☐ 15 – BLOCKED ☐ 16 – CANCELLED ☐ 17 – BLOCKED_OTHER_MASTER ☐ 18 – DOWNSTREAM_FAIL ☐ 126 – RESERVED ☐ 127 – UNDEFINED
ITEMS FOR OUTSTATIONS	
Timeout Waiting for Application Confirm of Solicited Response Message:	☒ Configurable, range 10 to 600 seconds (default = 10 (sec)) - with the parameter “APPL_CNF_TOUT” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
How often is Time Synchronization Required from the Master:	☒ Never needs time ☒ Periodically, between 100 and 1800 seconds - IIN1.4 will be set at startup and every 30 minutes (1800 seconds) after the last “Time Synchronization”, when the parameter “TIM_SYNC_REQ” of “SD_SDNP_SS_RS_OPEN/TCP_OPEN” is set to “TRUE”
Device Trouble Bit IIN1.6:	☒ Never used
File Handle Timeout:	☒ Not Applicable, Files Not Supported

Event Buffer Overflow Behavior:	☒ Discard the oldest event ☒ Discard the newest event - Selectable with the parameter “NWST_EVT_DEL” of “SD_SDNP_SS_RS_OPEN/TCP_OPEN” “NWST_EVT_DEL”=FALSE: Discard the Oldest Event (default) “NWST_EVT_DEL”=TRUE: Discard the Newest Event
Event Buffer Organization:	☒ Per Object Group.
	Event buffer sizes are configurable for each Object Group - at range from 0 to 135,000
	- Configurable with the following parameters of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” “BI_EVT_SIZE” - Binary Input event buffer size (default = 500) “CT_EVT_SIZE” - Binary Counter event buffer size (default = 500) “AI_EVT_SIZE” - Analog Input event buffer size (default = 500) - The flowing parameters are effective with “SD_CDNP_SS_ASSIGN2” POU. “BO_EVT_SIZE” - Binary Output event buffer size (default = 0) “AO_EVT_SIZE” - Analog Output event buffer size (default = 0) “OSTR_EVT_SIZE” - Octet String event buffer size (default = 0) (range from 0 to 67,500) “FRZ_CT_EVT_SIZE” - Frozen Counter event buffer size (default = 0)
	Within the following conditions; - Maximum event size of the all event buffers for all connections is 135,000. - Maximum event size for CPU Module with 64 MB or less main memory, with Java in use is 3500. - However, the octet string event size will be doubled and added to the total event size.
Sends Multi-Fragment Responses:	☒ Yes ☒ No
	<for event data> - The maximum number of the application layer multi-fragment is configurable with the parameter “FRGMNT_RESP” of “SD_CDNP_RS_OPEN/TCP_OPEN” “FRGMNT_RESP”=1 to 100: Maximum number of multi-fragment (1:Single-Fragment) “FRGMNT_RESP”=0: Multi-Fragment for all requested event (default) - for “SD_CDNP_SS_RS_OPEN” “FRGMNT_RESP”=UINT#16#8000: Auto configuration maximum number by baud rate also can be used.
	<for static data> - Static data can be sent with multi-fragment responses, if it is necessary.
Last Fragment Confirmation:	☒ Always
DNP Command Settings Preserved Through a Device Reset:	☒ Assign Class ☒ Analog Deadbands
Supports configuration signature:	☒ Not Supported
Requests Application Confirmation:	For event responses: ● Yes ○ No ○ Configurable For non-final fragments: ● Yes ○ No ○ Configurable
Supports Clock Management	☒ Yes (support both DNP3 time synchronization and SNTP)
OUTSTATION UNSOLICITED RESPONSE SUPPORT	
Supports Unsolicited Reporting:	☒ Yes ☒ No ☒ Configurable, selectable from On or Off - with the parameter “UNSOL_ALLOWED” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” “UNSOL_ALLOWED”=TRUE: Unsolicited Response mode is ON “UNSOL_ALLOWED”=FALSE: Unsolicited Response mode is OFF (default)
	Note for Serial Connection - Unsolicited Response must be used with the Point-to-point connection
	Note for Serial Communication Modules - “Full-duplex” should be selected for Duplex Operation by Resource Configurator
Master Data Link Address:	☒ Configurable, range 0 to 0xFFEF - The same master address is used for both solicited and unsolicited responses with the parameter “DST_ADDR” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”. - Addresses in the range 0xFFF0 through 0xFFFF are reserved by DNP3 for special use.
Unsolicited Response Confirmation Timeout:	☒ Configurable, range 10 to 600 seconds (default=10 (sec)) - The same value of “Application Layer Confirmation” is used with the parameter “APPL_CNF_TOUT” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”

Number of Unsolicited Retries:	☒ Configurable, range 0 to 10 (default=3) - with the parameter “UNSOL_RETRY_NUM” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
OUTSTATION UNSOLICITED RESPONSE TRIGGER CONDITIONS	
Number of Class 1 Events:	☒ Configurable, range 1 to 100 (default=5) - with the parameter “UNSOL_C1_TRG_NUM” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Number of Class 2 Events:	☒ Configurable, range 1 to 100 (default=5) - with the parameter “UNSOL_C2_TRG_NUM” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Number of Class 3 Events:	☒ Configurable, range 1 to 100 (default=5) - with the parameter “UNSOL_C3_TRG_NUM” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Total Number Events from Any Class:	☒ Total Number of Events not used to trigger Unsolicited Responses
Hold Time After Class 1 Event:	☒ Configurable, range 0 to 10 seconds (default=5 seconds) - with the parameter “UNSOL_C1_TRG_HOLD” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Hold Time After Class 2 Event:	☒ Configurable, range 0 to 10 seconds (default=5 seconds) - with the parameter “UNSOL_C2_TRG_HOLD” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Hold Time After Class 3 Event:	☒ Configurable, range 0 to 10 seconds (default=5 seconds) - with the parameter “UNSOL_C3_TRG_HOLD” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN”
Hold Time After Event Assigned to Any Class:	☒ Class events not used to trigger Unsolicited Responses
Retrigger Hold Time:	☒ Hold-time timer will be retriggered for each new event detected (may get more changes in next response)
Other Unsolicited Response Trigger Conditions:	☒ NONE
INDIVIDUAL FIELD OUTSTATION PARAMETERS	
Analog Data Type:	☒ Configurable by Logic Designer; - with the parameter “ANLG_TYPE” of “SD_CDNP_SS_ASSIGN” “ANLG_TYPE”=0: REAL (Single-Precision Floating Point) (default) “ANLG_TYPE”=1: DINT (32-Bit Integer)
Detail Data Types:	☒ Configurable by Logic Designer; - with the following parameters of “SD_CDNP_SS_ASSIGN2” “CT_MAX_INDEX” and “CT16/CT32_OFFSET” - Binary Counter data area “AI_MAX_INDEX” and “AI16/AI32/AISF/AIDF_OFFSET” - Analog Input data area “AO_MAX_INDEX” and “AO16/AO32/AOSF/AODF_OFFSET” - Analog Output data area
Analog Input Deadbands:	☒ Configurable - All Points - as the Default Deadband Value; - with the parameter “ANLG_DBND_VAL” of “SD_CDNP_SS_ASSIGN” (default = 0.0) ☒ Fixed at 0.0 – All Points – with “SD_CDNP_SS_ASSIGN2”
	☒ Configurable - Per Point - by “SD_CDNP_S_DBND” - DNP3 Analog Input Deadband Value Setting POU (SD_CDNP_S_DBND);
	☒ Configurable - Per Point - by Master
Time Value for all DNP3 protocol time stamps reported and time synchronization messages:	☒ Configurable, selectable from “Local Time” or “UTC” - by the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN/ASSIGN2” “OPTION”=DWORD#16#00000001: UTC “OPTION”=DWORD#16#00000000: Local Time (default) - The UTC time base has been used for the effective date since January 1, 2008.
Unsolicited Response:	☒ Configurable – Per Connection by “SD_CDNP_SS_RS/TCP_OPEN” with “SD_CDNP_SS_ASSIGN2”
Event Class Assign:	☒ Configurable - All Points - as the default event class for each data type;
	- with the following parameters of “SD_CDNP_SS_ASSIGN/ASSIGN2” “BI_EVT_CLASS”=0/1/2/3 - Binary Input event class (default = 1) “CT_EVT_CLASS”=0/1/2/3 - Binary Counter event class (default = 3) “AI_EVT_CLASS”=0/1/2/3 - Analog Input event class (default = 2)
	- with the following parameters of “SD_CDNP_SS_ASSIGN2” “BO_EVT_CLASS”=0/1/2/3 - Binary Output event class (default = 0) “AO_EVT_CLASS”=0/1/2/3 - for Analog Output event class (default = 0) “OSTR_EVT_CLASS”=0/1/2/3 - for Octet String event class (default = 0) “FRZ_CT_EVT_CLASS”=0/1/2/3 - Frozen Counter event class (default=0)
	☒ Configurable - Per Point - with “SD_CDNP_S_EVTC”
	☒ Configurable - Per Point - by Master
Preservation of Class Assign through a Device Reset:	☒ No - (If any of Class Assign are written by a Master, the Master will have to write them again.) ☒ Yes - (with “SC_CDNP_S_EVTC”)

Preservation of Analog Input Deadband Settings Per Point through a Device Reset:	☒ No - (If any of Analog Input Deadbands are written by a Master, the Master will have to write them again) ☒ Yes - (with “SD_CDNP_S_DBND”)
File Handling:	☒ Not Supported
Control Relay Output Block (CROB) Operation:	☒ Yes
Analog Output Block (AOB) Operation:	☒ Yes
Latch model CROB Operation Attribute:	☒ Configurable - All Points - as the default Latch model CROB operation attribute; - with the parameter “CROB_ATTRIB” of “SD_CDNP_SS_ASSIGN/ASSIGN2” “CROB_ATTRIB”=0: No operation is enabled (default) “CROB_ATTRIB”=1: Latch ON/OFF operation is enabled
	☒ Configurable - Per Point - with the parameter “ATTRIB” of “SD_CDNP_S_CROB” “ATTRIB”=0: No operation is enabled (default) “ATTRIB”=1: Latch ON/OFF operation is enabled
Pulse Model CROB Operation Execution:	☒ Definable - Per Point - with “SD_CDNP_S_CROB_PULSE” (effective with “SD_CDNP_SS_ASSIGN2”)
Binary Output Change Event generating by remote operation: Analog Output Change Event generating by remote operation:	☒ Selectable by Logic Designer; - by the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION”=DWORD#16#00000020: Output events will be generated by Remote operation of CROB commands or Analog output operation commands from the master station. This option will be effective with following configurations. - BO/AO_EVT_CLASS != 0 (by SD_CDNP_SS_ASSIGN2 POU or SD_CDNP_S_EVTC POU) - BO/AO_EVT_SIZE != 0 (by SD_CDNP_SS_RS_OPEN or SD_CDNP_SS_TCP_OPEN POU) And for Binary Outputs, “Latch Model CROB Operation Attribute” or “Pulse Model CROB Operation Command Executing POU” must be defined.
Binary Counter Change Event generating by remote Freeze and Clear operation:	☒ Selectable by Logic Designer; - by the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION”=DWORD#16#00000040: Binary Counter Change events will be generated by Remote Freeze and Clear operation commands from the master station. This option will be effective with following configuration. - “CT_EVT_CLASS” != 0 (by SD_CDNP_SS_ASSIGN2 POU or SD_CDNP_S_EVTC POU) - “CT_EVT_SIZE” != 0 (by SD_CDNP_SS_RS_OPEN or SD_CDNP_SS_TCP_OPEN POU)
Octet String Change Event generating by remote operation:	☒ Selectable by Logic Designer; - by the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION”=DWORD#16#00000080: Octet String Change events will be generated by Remote operation commands from the master station. This option will be effective with following configuration. - “OSTR_EVT_CLASS” != 0 (by SD_CDNP_SS_ASSIGN2 POU or SD_CDNP_S_EVTC POU) - “OSTR_EVT_SIZE” != 0 (by SD_CDNP_SS_RS_OPEN or SD_CDNP_SS_TCP_OPEN POU)

This Device Properties is referred to “DNP3 SPECIFICATION DEVICE PROFILE, Version 2016, April-2016”.

●Capabilities for Device Database

SINGLE-BIT BINARY INPUT POINTS **Static (Steady-State) Object Number: 1** **Event Object Number: 2**	
Static Variation reported when variation 0 requested or in response to Class polls	☒ Variation 2 - with flag
Event Variation reported when variation 0 requested or in response to Class polls	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 2 - with absolute time
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Variation 1 - without time (optional) ☒ Variation 2 - with absolute time (default) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Event reporting mode	☒ All events
Binary Inputs included in Class 0 response:	☒ Always
Binary Inputs Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=500) - with the parameter “BI_EVT_SIZE“ of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000.
BINARY OUTPUT STATUS AND CONTROL RELAY OUTPUT BLOCK **Binary Output Status Object Number: 10** **Binary Output Event Object Number: 11** **CROB Object Number: 12**	
Minimum pulse time allowed with Trip, Close and Pulse On/Off commands.	☒ Fixed at 0 ms (accuracy will be the control task execution period) - However, the 0-ms On-time for Trip/Close/Pulse On commands and the 0-ms Off-time for Trip/Close/Pulse Off commands are not allowed.
Maximum pulse time allowed with Trip, Close and Pulse On/Off commands.	☒ Fixed at 60000 ms (accuracy will be the control task execution period)
Binary Output Status included in Class 0 response:	☒ Always
Static Variation reported when variation 0 requested or in response to Class polls:	☒ Variation 2 - output status with flags
Event Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 2 - status with time
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Variation 1 – status without time (optional) ☒ Variation 2 – status with time (default) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Event reporting mode:	☒ All events
Maximum Time between Select and Operate:	☒ Configurable, range from 1 to 600 seconds (default=5) - with the parameter “SBO_SEL_TOUT” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - SBO operation is effective with “SD_CDNP_SS_ASSIGN2”
Binary Outputs Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=0) - with the parameter “BO_EVT_SIZE“ of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000.
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**	
Static Counter Variation reported when variation 0 requested or in response to Class polls	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 1 - 32-bit with flag
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 1 or 2)

Counter Event Variation reported when variation 0 requested or in response to Class polls	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 5 - 32-bit with flag and time
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 5 or 6) (default) ☒ Based on point index (Variation 1 or 2) (without time - optional) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Counter included in Class 0 response:	☒ Always
Counter Event reporting mode	☒ All events
Static Frozen Counter Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 1 or 2) - Frozen Counter can be handled with “SD_CDNP_SS_ASSIGN2”
Frozen Counter Event Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 5 or 6) (default) ☒ Based on point index (Variation 1 or 2) (without time - optional) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Frozen Counters included in Class 0 response:	☒ Always (default) ☒ Never (optional) - “Never” can be selected by following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00000100: Frozen counter class 0 response stop bit - Frozen Counter can be handled with “SD_CDNP_SS_ASSIGN2”
Frozen Counter Event reporting mode:	☒ All frozen events - Frozen Counter Event can be handled with “SD_CDNP_SS_ASSIGN2”
Counter Roll Over at:	<with “SD_CDNP_SS_ASSIGN”> ☒ 32 Bits (4,294,967,295)
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (16 Bits or 32 Bits)
Counter frozen by means of:	☒ Master Request - Frozen command can be handled with “SD_CDNP_SS_ASSIGN2”
Counters Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=500) - with the parameter “CT_EVT_SIZE” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types is 135000.
Frozen Counters Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=0) - with the parameter “FRZ_CT_EVT_SIZE” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000. - Frozen Counter Event can be handled with “SD_CDNP_SS_ASSIGN2”
Reports counter events for change of value:	☒ Yes for all counters ☒ No for all counters - Selectable with the parameter “CT_EVT_CLASS” of “SD_CDNP_SS_ASSIGN/ASSIGN2” and “CT_EVT_SIZE” of “SD_CNDP_SS_RS/TCP_OPEN”. ☒ Configurable, based on point Index - Configurable with the parameter “EVT_CLASS” of “SD_CDNP_S_EVTC” or assign class command from SCADA/Master.
ANALOG INPUT POINTS **Static (Steady-State) Object Number: 30** **Event Object Number: 32** **Analog Input Deadband Object Number: 34**	
Static Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 1 - 32-bit with flag (DINT) ☒ Variation 5 - single-precision floating point with flag (REAL) - “DINT” or “REAL” is selectable with the parameter “ANLG_TYPE” of “SC_CDNP_ASSIGN”
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 1, 2 or 5)

Event Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 3 - 32-bit with time (DINT) ☒ Variation 7 - single-precision floating point with time (REAL) - “DINT” or “REAL” is selectable with the parameter “ANLG_TYPE” of “SC_CDNP_ASSIGN”
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 3, 4, 7 or 8) (default) ☒ Based on point index (Variation 1, 2, 5 or 6) (without time - optional) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Event reporting mode	☒ All events
Analog Inputs included in Class 0 response:	☒ Always
How Deadbands are set:	☒ Configurable through DNP ☒ Configurable via other means - Configurable with “SD_CDNP_S_DBND” POU for each point with SD_CDNP_SS_ASSIGN2 POU. - Configurable with the parameter “ANLG_DBND_VAL” of SD_CDBP_SS_ASSIGN POU for all points.
Analog Deadband Algorithm:	☒ Simple - just compare the difference from the previous reported value
Analog Inputs Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=500) - with the parameter “AI_EVT_SIZE” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000.
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**	
Static Analog Output Status Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 1 - 32-bit with flag (DINT) ☒ Variation 3 - single-precision floating point with flag (REAL) - “DINT” or “REAL” is selectable with the parameter “ANLG_TYPE” of “SC_CDNP_ASSIGN”
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 1, 2, 3 or 4)
Analog Output Status included in Class 0 response:	☒ Always
Event Variation reported when variation 0 requested or in response to Class polls:	<with “SD_CDNP_SS_ASSIGN”> ☒ Variation 3 - 32-bit with time (DINT) ☒ Variation 7 - single-precision floating point with time (REAL) - “DINT” or “REAL” is selectable with the parameter “ANLG_TYPE” of “SC_CDNP_ASSIGN”
	<with “SD_CDNP_SS_ASSIGN2”> ☒ Based on point index (Variation 3, 4, 7 or 8) (default) ☒ Based on point index (Variation 1, 2, 5 or 6) (without time - optional) - “without time” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00004000: All event data without time stamp bit
Event reporting mode:	☒ All events
Maximum Time between Select and Operate:	☒ Configurable, range from 1 to 600 seconds (default=5) - with the parameter “SBO_SEL_TOUT” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - SBO operation is effective with “SD_CDNP_SS_ASSIGN2”
Analog Outputs Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=0) - with the parameter “AO_EVT_SIZE“ of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000.
OCTET STRING POINTS **Static (Steady-State) Object Number: 110** **110Event Object Number: 111**	
Event reporting mode:	☒ All events - Octet String Event can be handled with “SD_CDNP_SS_ASSIGN2”
Octet Strings included in Class 0 response:	☒ Always (default) ☒ Never (optional) - “Never” is selectable with the following bit of the parameter “OPTION” of “SD_CDNP_SS_ASSIGN2” “OPTION” = DWORD#16#00000400: Octet string class 0 response stop bit - Octet String can be handled with “SD_CDNP_SS_ASSIGN2”

Maximum number of octets that can be handled in an Octet String Data:	☒ Fixed at 32-Octets - Octet String can be handled with ASSIGN2 POU
Octet Strings Event Buffer Organization:	☒ Configurable, range 0 to 135000 (default=0) - with the parameter “OSTR_EVT_SIZE” of “SD_CDNP_SS_RS_OPEN/TCP_OPEN” - Total maximum event size for all data types and all connections is 135000. - Octet String Event can be handled with “SD_CDNP_SS_ASSIGN2”
Object Group Selection	☒ Fixed, group 110 for all objects

This Capabilities for Device Database is referred to “DNP3 SPECIFICATION DEVICE PROFILE Version 2016, April-2016.”

●Implementation Table

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input - Any variation (Variation 0 is used to request default variation)	1 (read), 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
1	1	Binary Input - Packed format	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
1	2	Binary Input - With flags	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
2	0	Binary Input Change Event - Any variation (Variation 0 is used to request default variation)	1 (read)	06 (all), 07, 08 (limited qty)		
2	1	Binary Input Change Event without Time	1 (read)	06 (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 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
10	0	Binary Output Status - Any variation (Variation 0 is used to request default variation)	1 (read) 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
10	1	Binary Output Status - Packed format	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
10	2	Binary Output Status - Output status with flags	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
11	0	Binary Output Event - Any variation (Variation 0 is used to request default variation)	1 (read)	00, 01 (start-stop), 06 (all)		
11	1	Binary Output Event - Status without time	1 (read)	00, 01 (start-stop), 06 (all)	129 (response) 130 (unsol. resp.)	17, 28 (index)
11	2	Binary Output Event - Status with time	1 (read)	00, 01 (start-stop), 06 (all)	129 (response) 130 (unsol. resp.)	17, 28 (index)
12	1	Binary Output Command - Control relay output block (CROB)	03 (select), 04 (operate), 05 (direct perate), 06 (direct op, no ack)	17, 28 (index)	129 (response)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
20	0	Counter – Any variation (Variation 0 is used to request default variation)	1 (read), 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
			7 (freeze), 8 (freeze no ack), 9 (freeze & clear), 10 (frz & clr, no ack)	00, 01 (start-stop), 06 (all)		
20	1	Counter - 32-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
20	2	Counter - 16-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
20	5	Counter - 32-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
20	6	Counter - 16-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	0	Frozen Counter -Any variation (Variation 0 is used to request default variation)	1 (read) 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
21	1	Frozen Counter - 32-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	2	Frozen Counter - 16-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	5	Frozen Counter - 32-bit with flag and time	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	6	Frozen Counter - 16-bit with flag and time	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	9	Frozen Counter - 32-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
21	10	Frozen Counter -16-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
22	0	Counter Change Event - Any variation (Variation 0 is used to request default variation)	1 (read)	06 (all), 07, 08 (limited qty)		
22	1	Counter Change Event - 32-bit with flag	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
22	2	Counter Change Event - 16-bit with flag	1 (read)	06 (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 (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 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
23	0	Frozen Counter Change Event - Any variation (Variation 0 is used to request default variation)	1 (read)	06 (all), 07, 08 (limited qty)		
23	1	Frozen Counter Change Event - 32-bit with flag	1 (read)	06 (all), 07, 08 (limited qty)	129 (response)	17, 28 (index)
23	2	Frozen Counter Change Event - 16-bit with flag	1 (read)	06 (all), 07, 08 (limited qty)	129 (response)	17, 28 (index)
23	5	Frozen Counter Change Event - 32-bit with flag and time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response)	17, 28 (index)
23	6	Frozen Counter Change Event - 16-bit with flag and time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response)	17, 28 (index)
30	0	Analog Input - Any variation (Variation 0 is used to request default variation)	1 (read), 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
30	1	Analog Input - 32-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
30	2	Analog Input - 16-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
30	3	Analog Input - 32-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
30	4	Analog Input -16-bit without flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
30	5	Analog Input - Single-precision floating point with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
30	6	Analog Input - Double-precision floating point with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
32	0	Analog Input Change Event - Any variation (Variation 0 is used to request default variation)	1 (read)	06 (all), 07, 08 (limited qty)		
32	1	Analog Input Change Event - 32-bit without time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
32	2	Analog Input Change Event -16-bit without time	1 (read)	06 (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 (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 (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 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
32	6	Analog Input Change Event - Double-precision floating point without time	1 (read)	06 (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 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
32	8	Analog Input Change Event - Double-precision floating point with time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
34	0	Analog Input Deadband - Any variation (Variation 0 is used to request default variation)	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
34	1	Analog Input Deadband - 16-bit	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
			2 (write)	00, 01 (start-stop), 07, 08 (limited qty), 17, 28 (index)		
34	2	Analog Input Deadband - 32-bit	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
			2 (write)	00, 01 (start-stop), 07, 08 (limited qty), 17, 28 (index)		
34	3	Analog Input Deadband - Single-precision floating point	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
			2 (write)	00, 01 (start-stop), 07, 08 (limited qty), 17, 28 (index)		
40	0	Analog Output Status – Any variation (Variation 0 is used to request default variation)	1 (read) 22 (assign class)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)		
40	1	Analog Output Status -32-bit with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
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 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
40	3	Analog Output Status - Single-precision floating point with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
40	4	Analog Output Status - Double-precision floating point with flag	1 (read)	00, 01 (start-stop), 06 (all), 07, 08 (limited qty), 17, 28 (index)	129 (response)	00, 01 (start-stop), 17, 28 (index)
41	1	Analog Output Command - 32-bit	03 (select), 04 (operate), 05 (direct operate), 06 (direct op, no ack)	17, 28 (index)	129 (response)	17, 28 (index)
41	2	Analog Output Command - 16-bit	03 (select), 04 (operate), 05 (direct operate), 06 (direct op, no ack)	17, 28 (index)	129 (response)	17, 28 (index)
41	3	Analog Output Command - Single-precision floating point	03 (select), 04 (operate), 05 (direct operate), 06 (direct op, no ack)	17, 28 (index)	129 (response)	17, 28 (index)
41	4	Analog Output Command - Double-precision floating point	03 (select), 04 (operate), 05 (direct operate), 06 (direct op, no ack)	17, 28 (index)	129 (response)	17, 28 (index)
42	0	Analog Output Change Event - Any variation (Variation 0 is used to request default variation)	1 (read)	06 (all), 07, 08 (limited qty)		
42	1	Analog Output Change Event - 32-bit without time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	2	Analog Output Change Event - 16-bit without time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	3	Analog Output Change Event - 32-bit with time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	4	Analog Output Change Event - 16-bit with time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	5	Analog Output Change Event - Single-precision floating point without time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	**Variation Number**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
42	6	Analog Output Change Event - Double-precision floating point without time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	7	Analog Output Change Event - Single-precision floating point with time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
42	8	Analog Output Change Event - Double-precision floating point with time	1 (read)	06 (all), 07, 08 (limited qty)	129 (response) 130 (unsol. resp.)	17, 28 (index)
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 = 1)		
52	2	Time Delay - Fine			129 (response)	07 (limited qty = 1)
60	1	Class Objects - Class 0 Data	1 (read)	06 (all)		
			22 (assign class)	06 (all)		
60	2	Class Objects - Class 1 Data	1 (read)	06 (all), 07, 08 (limited qty)		
			20 (enable unsol) 21 (disable unsol) 22 (assign class)	06 (all)		
60	3	Class Objects - Class 2 Data	1 (read)	06 (all), 07, 08 (limited qty)		
			20 (enable unsol) 21 (disable unsol) 22 (assign class)	06 (all)		
60	4	Class Objects - Class 3 Data	1 (read)	06 (all), 07, 08 (limited qty)		
			20 (enable unsol) 21 (disable unsol) 22 (assign class)	06 (all)		
80	1	Internal Indications	1 (read)	00, 01 (start-stop)		
			2 (write)	00 index=7 (start-stop)		
110	0	Octet String (range is 0 to 29, up to 32-octets can be handled)	22 (assign class)	00, 01 (start-stop), 06 (all), 17, 28 (index)		
			1 (read)	00, 01 (start-stop) 06 (all), 17, 28 (index)	-	-
	string length		-	-	129 (response)	17, 28 (index)
			2 (write)	00, 01 (start-stop) 17, 28 (index)	-	-

DNP OBJECT GROUP & VARIATION			REQUEST (FCN/FCJ will parse)		RESPONSE (FCN/FCJ will respond)	
Group Number	**Variation Number**	**Description**	**Function Codes (dec)**	**Qualifier Codes (hex)**	**Function Codes (dec)**	**Qualifier Codes (hex)**
111	0	Octet String Event (range is 0 to 29, up to 32-octets can be handled)	1 (read)	06 (all), 07, 08 (limited qty)	-	-
	string length		-	-	129 (response)	17, 28 (index)
					130 (unsol. resp.)	17, 28 (index)
No Object (function code only)			23 (delay measurement)			
No Object (function code only)			24 (recode current time)			

This Implementation Table is referred to “DNP3 SPECIFICATION, Volume 6 Part2, Objects, DNP3 OBJECT LIBRARY Version 2.05, 11-June-2009” and “DNP3 Technical Bulletin TB2015-001 Object Groups 110-115”.

■ ORDERING INFORMATION

DNP3 Communication Portfolio Licenses for FCN-500 and FCN-RTU runtime environment are bundled with CPU module.

For the type of software media supplied, refer to the separate GS, “Application Portfolios” (publication number GS 34P02P20-02E).

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