PowerLogic ION7400 DNP 3.0 device profile

This document describes the DNP V3.0 communications protocol employed by PowerLogic™ ION7400 meters. The DNP protocol can be selected for the following:

- the RS-485 serial communication port
- up to three Ethernet connections.

A maximum of three ports/connections in total may be used at the same time.

It is assumed that the reader is familiar with the DNP V3.0 protocol and serial communications in general.

In this document

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Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

Notice is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on the device or equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Do not exceed the device's ratings for maximum limits.
- Do not use the device for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Do not incorrectly configure ION modules. Do not modify a module's configuration without understanding the impact to the meter and any associated devices.

Failure to follow these instructions will result in death or serious injury.

1. DNP device profile

DNP V3.0

DEVICE PROFILE DOCUMENT

Vendor Name: **Power Measurement Ltd**

Device Name: **ION7400**

Highest DNP Level Supported:	Device Function:
For Requests: **Level 2** For Responses: **Level 2**	☐ Master ☒ **Slave**

Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):

For static (non-change-event) object requests, request qualifier codes 07 and 08 (limited quantity), and 17 and 28 (index) are supported. Static object requests sent with qualifiers 07, or 08, will be responded with qualifiers 00 or 01.

16-bit, 32-bit and Floating Point Analog Change Events with Time may be requested.
16-bit, 32-bit Frozen Analog Input and Frozen Analog Events with and without Time may be requested.
Floating Point Analog Output Status and Output Block Objects 40 are supported.

Maximum Data Link Frame Size (octets):	Maximum Application Fragment Size (octets):
Transmitted: **292** Received **292**	Transmitted: **Configurable 50 to 2048** Received **2048**

Maximum Data Link Re-tries:	Maximum Application Layer Re-tries:
☐ None ☐ Fixed ☒ **Configurable from 0 to 15**	☒ **None** ☐ Configurable

Requires Data Link Layer Confirmation:

- ☐ Never
- ☐ Always
- ☐ Sometimes
- ☒ **Configurable as: Never, Only for multi-frame messages, or Always**

Requires Application Layer Confirmation:

- ☐ Never
- ☐ Always
- ☐ When reporting Event Data (Slave devices only)
- ☐ When sending multi-fragment responses (Slave devices only)
- ☐ Sometimes
- ☒ **Configurable as: "Only when reporting event data", or "When reporting event data or multi-fragment messages."**

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DEVICE PROFILE DOCUMENT

Timeouts while waiting for:

Data Link Confirm:	☐ None	☐ Fixed at ____	☐ Variable	☒ **Configurable.**
Complete Appl. Fragment:	☒ **None**	☐ Fixed at ____	☐ Variable	☐ Configurable
Application Confirm:	☐ None	☒ **Fixed at 10s**	☐ Variable	☐ Configurable**.**
Complete Appl. Response:	☒ **None**	☐ Fixed at ____	☐ Variable	☐ Configurable

Others: Transmission Delay, configurable
Select/Operate Arm Timeout, configurable 0 sec to 30 sec
Need Time Interval, configurable 1 sec to 86400 sec (1 day)
Data Link Confirm Timeout, configurable 0.1 sec to 30 sec
Unsolicited Notification Delay, random value between 1 and 10 sec
Unsolicited Response Retry Delay, configurable 1 sec to 7200 sec (2 hours)
Unsolicited Max Number of Retries, configurable 0 to 100, 0 is infinite retries
Binary Change Event Scan Period, fixed at 1 sec
Analog Change Event Scan Period, fixed at 1 sec
Counter Change Event Scan Period, fixed at 1 sec
Frozen Counter Change Event Scan Period, fixed at 1 sec
Analog Change Event Scan Period, fixed at 1 sec
Frozen Analog Change Event Scan Period, fixed at 1 sec

Sends/Executes Control Operations:

WRITE Binary Outputs	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
SELECT/OPERATE	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
DIRECT OPERATE	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
DIRECT OPERATE – NO ACK	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
Count > 1	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Pulse On	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
Pulse Off	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Latch On	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
Latch Off	☐ Never	☒ **Always**	☐ Sometimes	☐ Configurable
Queue	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable
Clear Queue	☒ **Never**	☐ Always	☐ Sometimes	☐ Configurable

Attach explanation if 'Sometimes' or 'Configurable' was checked for any operation.

Reports Binary Input Change Events when no specific variation requested:

☐ Never
☐ Only time-tagged
☐ Only non-time-tagged
☒ **Configurable to send time-tagged or non-time-tagged**

Reports time-tagged Binary Input Change Events when no specific variation requested:

☐ Never
☐ Binary Input Change With Time
☐ Binary Input Change With Relative Time
☒ **Configurable to Binary Input Change With Time and Binary Input Change With Relative Time**

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DEVICE PROFILE DOCUMENT

Sends Unsolicited Responses: ☒ **Never** ☐ Configurable – enable/disable ☐ Only certain objects ☐ Sometimes (attach explanation) ☐ ENABLE/DISABLE UNSOLICITED Function codes supported	Sends Static Data in Unsolicited Responses: ☒ **Never** ☐ When Device Restarts ☐ When Status Flags Change No other options are permitted.
Default Counter Object/Variation: ☐ No Counters Reported ☒ **Configurable** ☐ Default Object Default Variation: ☐ Point-by-point list attached	Counters Roll Over at: ☐ No Counters Reported ☒ **Configurable – controlled partly by rollover configured in input ION modules. See the *Multiport DNP 3.0 and ION Technology* technical note.** ☐ 16 Bits ☐ 32 Bits ☐ Other Value: _____ ☐ Point-by-point list attached

Sends Multi-Fragment Responses:

☐ Yes

☐ No

☒ **Configurable – "Always" or "When reporting Event Data"**

Sequential File Transfer Support:

Append File Mode	☐ Yes	☒ **No**
Custom Status Code Strings	☐ Yes	☒ **No**
Permissions Field	☐ Yes	☒ **No**
File Events Assigned to Class	☐ Yes	☒ **No**
File Events Send Immediately	☐ Yes	☒ **No**
Multiple Blocks in a Fragment	☐ Yes	☒ **No**
Max Number of Files Open	**0**	

Requires Data Link Layer Confirmation:

☐ Never
☐ Always
☐ Sometimes If 'Sometimes', when? _____

☒ Configurable If 'Configurable', how?

User option to set Data Link Confirmation to:

- **Always** – device will always request Data Link Confirmations.
- **Multi-packet only** – the device will request Data Link Confirmations when sending multi-packet responses.
- **Never** – the device will never request Data Link Confirmations.

Requires Application Layer Confirmation:

☐ Never
☐ Always (not recommended)
☒ When reporting Event Data (Slave devices only)
☐ When sending multi-fragment responses (Slave devices only)

☐ Sometimes If 'Sometimes', when? _____

☐ Configurable If 'Configurable', how? _____

Timeouts while waiting for:

Data Link Confirm	☐ None	☐ Fixed at __	☐ Variable	☒ Configurable
Complete Appl. Fragment	☒ None	☐ Fixed at __	☐ Variable	☐ Configurable
Application Confirm	☒ None	☐ Fixed at __	☐ Variable	☐ Configurable
Complete Appl. Response	☒ None	☐ Fixed at __	☐ Variable	☐ Configurable

Others _____

Attach explanation if 'Variable' or 'Configurable' was checked for any timeout

- **Data Link Confirm timeout** is configurable: 0.1s to 30s

Sends/Executes Control Operations:

WRITE Binary Outputs	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
SELECT/OPERATE	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
DIRECT OPERATE - NO ACK	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Count > 1	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Pulse On	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Pulse Off	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Latch On	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Latch Off	☐ Never	☒ Always	☐ Sometimes	☐ Configurable
Queue	☒ Never	☐ Always	☐ Sometimes	☐ Configurable
Clear Queue	☒ Never	☐ Always	☐ Sometimes	☐ Configurable

- **Select timeout** period is configurable: 0s to 30s

FILL OUT THE FOLLOWING ITEMS FOR SLAVE DEVICES ONLY:

Reports Binary Input Change Events when no specific variation requested:

☐ Never
☐ Only time-tagged
☐ Only non-time-tagged
☒ Configurable to send both, one or the other (explanation below)

User option to have all Binary Input Change Events returned as either:
- time-tagged OR
- non-time-tagged

Reports time-tagged Binary Input Change Events when no specific variation requested:

☐ Never
☒ Binary Input Change With Time
☐ Binary Input Change With Relative Time
☐ Configurable (attach explanation)

Sends Unsolicited Responses:

☒ Never
☐ Configurable (attach explanation)
☐ Only certain objects
☐ Sometimes (attach explanation)

☐ ENABLE/DISABLE UNSOLICITED Function codes supported

Sends Static Data in Unsolicited Responses:

☒ Never
☐ When Device Restarts
☐ When Status Flags Change

No other options are permitted.

Default Counter Object/Variation: ☐ No Counters Reported ☒ Configurable (explanation below) ☐ Default Object _____ ☐ Default Variation _____ ☐ Point-by-point list attached User option to return all static counters in one of the following variations: • 32-Bit Binary Counter • 32-Bit Binary Counter Without Flag • 16-Bit Binary Counter • 16-Bit Binary Counter Without Flag	Counters Roll Over at: ☐ No Counters Reported ☒ Configurable (explanation below) ☐ 16 Bits ☐ 32 Bits ☐ Other Value _____ ☐ Point-by-point list attached User option to select roll over: • 32 bit counters roll over at 2^32. • 16 bit counters roll over at 2^16
Sends Multi-Fragment Responses: ☐ Yes ☒ No	

1.1 Implementation table

Level 2 Implementation (DNP-L2)

Your meter's digital and analog outputs may change state when being configured, during an option module reset or power cycle, or during firmware or framework upgrade.

⚠ WARNING

HAZARD OF UNINTENDED OPERATION

Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

Failure to follow these instructions can result in death or serious injury.

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)	
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes**	**Qual Codes (hex)**
1	0	Binary Input - Any Variation	1	00,01,06,07,08, 17,28		
1	1	Binary Input	1	00,01,06,07,08, 17,28	129	00,01,17,28
1	2	Binary Input with Status	1	00,01,06,07,08, 17,28	129	00,01,17,28
2	0	Binary Input Change - All Variations	1	06,07,08		
2	1	Binary Input Change without Time	1	06,07,08	129	17,28
2	2	Binary Input Change with Time	1	06,07,08	129	17,28
2	3	Binary Input Change with Relative Time	1	06,07,08	129	17,28
10	0	Binary Output – always mapped to variation 2				
10	1	Binary Output	1	00,01,06,07,08, 17,28	129	00,01,17,28
10	2	Binary Output Status	1	00,01,06,07,08, 17,28	129	00,01,17,28
12	1	Control Relay Output Block	3,4,5,6	17,28	129	echo of request
12	2	Pattern Control Block				
12	3	Pattern Mask				

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes**	**Qual Codes (hex)**	
20	0	Binary Counter - Any Variation	1	00,01,06,07,08, 17,28			
			7,8	00,01,06,07,08			
20	1	32-Bit Binary Counter	1	00,01,06,07,08, 17,28	129	00,01,17,28	
20	2	16-Bit Binary Counter	1	00,01,06,07,08, 17,28	129	00,01,17,28	
20	5	32-Bit Binary Counter without Flag	1	00,01,06,07,08, 17,28	129	00,01,17,28	
21	0	Frozen Counter - Any Variation	1	00,01,06,07,08, 17,28			
21	1	32-Bit Frozen Counter	1	00,01,06,07,08, 17,28	129	00,01,17,28	
21	2	16-Bit Frozen Counter	1	00,01,06,07,08, 17,28	129	00,01,17,28	
21	5	32-Bit Frozen Counter with Time of Freeze	1	00,01,06	129	00,01,17,28	** [1]
21	6	16-Bit Frozen Counter with Time of Freeze	1	00,01,06	129	00,01,17,28	**
21	9	32-Bit Frozen Counter without Flag	1	00,01,06	129	00,01,17,28	
21	10	16-Bit Frozen Counter without Flag	1	00,01,06	129	00,01,17,28	
22	0	Counter Change Event - Any Variation	1	06,07,08			
22	1	32-Bit Counter Change Event without Time	1	06,07,08	129	17,28	
22	2	16-Bit Counter Change Event without Time	1	06,07,08	129	17,28	
22	5	32-Bit Counter Change Event with Time	1	06,07,08	129	17,28	**
22	6	16-Bit Counter Change Event with Time	1	06,07,08	129	17,28	**
23	0	Frozen Counter Event - Any Variation	1	06,07,08			**
23	1	32-Bit Frozen Counter Event without Time	1	06,07,08	129	17,28	**
23	2	16-Bit Frozen Counter Event without Time	1	06,07,08	129	17,28	**
23	5	32-Bit Frozen Counter Event with Time	1	06,07,08	129	17,28	**
23	6	16-Bit Frozen Counter Event with Time	1	06,07,08	129	17,28	**

[1] The device can be configured to respond with the object/variations marked with "**". Note that these object/variations are not listed in the DNP V3.00 Subset 2 definitions. If the meter is configured to respond with these objects, care must be taken to ensure that the master can parse the response.

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes**	**Qual Codes (hex)**	
30	0	Analog Input - Any Variation	1,7,8	00,01,06,07,08, 17,28			
30	1	32-Bit Analog Input	1	00,01,06,07,08, 17,28	129	00,01,17,28	
30	2	16-Bit Analog Input	1	00,01,06,07,08, 17,28	129	00,01,17,28	
30	3	32-Bit Analog Input without Flag	1	00,01,06,07,08, 17,28	129	00,01,17,28	
30	4	16-Bit Analog Input without Flag	1	00,01,06,07,08, 17,28	129	00,01,17,28	
30	5	Short Floating Point	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
30	6	Long Floating Point	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	0	Frozen Analog Input - Any Variation	1	00,01,06,07,08, 17,28			**
31	1	32-Bit Frozen Analog Input	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	2	16-Bit Frozen Analog Input	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	3	32-Bit Frozen Analog Input with Time of Freeze	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	4	16-Bit Frozen Analog Input with Time of Freeze	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	5	32-Bit Frozen Analog Input without Flag	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
31	6	16-Bit Frozen Analog Input without Flag	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
32	0	Analog Change Event - Any Variation	1	06,07,08			
32	1	32-Bit Analog Change Event without Time	1	06,07,08	129	17,28	
32	2	16-Bit Analog Change Event without Time	1	06,07,08	129	17,28	
32	3	32-Bit Analog Change Event with Time	1	06,07,08	129	17,28	**
32	4	16-Bit Analog Change Event with Time	1	06,07,08	129	17,28	**
32	5	Short Floating Point Analog Change Event without Time	1	06,07,08	129	17,28	**

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes**	**Qual Codes (hex)**	
32	6	Long Floating Point Analog Change Event without Time	1	06,07,08	129	17,28	**
32	7	Short Floating Point Analog Change Event with Time	1	06,07,08	129	17,28	**
32	8	Long Floating Point Analog Change Event with Time	1	06,07,08	129	17,28	**
33	0	Frozen Analog Event - Any Variation	1	06,07,08	129	17,28	**
33	1	32-Bit Frozen Analog Event without Time	1	06,07,08	129	17,28	**
33	2	16-Bit Frozen Analog Event without Time	1	06,07,08	129	17,28	**
33	3	32-Bit Frozen Analog Event with Time	1	06,07,08	129	17,28	**
33	4	16-Bit Frozen Analog Event with Time	1	06,07,08	129	17,28	**
40	0	Analog Output Status – Any Variation	1	00,01,06,07,08, 17,28			
40	1	32-Bit Analog Output Status	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
40	2	16-Bit Analog Output Status	1	00,01,06,07,08, 17,28	129	00,01,17,28	
40	3	Short Floating Point Analog Output Status	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
40	4	Long Floating Point Analog Output Status	1	00,01,06,07,08, 17,28	129	00,01,17,28	**
41	0	Analog Output Block - Any Variation					
41	1	32-Bit Analog Output Block	3,4,5,6	17,28	129	echo of request	**
41	2	16-Bit Analog Output Block	3,4,5,6	17,28	129	echo of request	
41	3	Short Floating Point Analog Output Block	3,4,5,6	17,28	129	echo of request	**
41	4	Long Floating Point Analog Output Block	3,4,5,6	17,28	129	echo of request	**
50	0	Time and Date - Any Variation					
50	1	Time and Date	1	00,01,06,07,08	129	00,01,17,28	**
			2	07 where quantity = 1			
52	0	Time Delay - All Variations					
52	1	Time Delay Coarse			129	07, quantity=1	

OBJECT			REQUEST (slave must parse)		RESPONSE (master must parse)		
Obj	**Var**	**Description**	**Func Codes (dec)**	**Qual Codes (hex)**	**Func Codes**	**Qual Codes (hex)**	
52	2	Time Delay Fine			129	07, quantity=1	
60	0	Not defined					
60	1	Class 0 Data	1	06,07,08			
60	2	Class 1 Data	1	06,07,08			
60	3	Class 2 Data	1	06,07,08			
60	4	Class 3 Data	1	06,07,08			
80	1	Internal Indications	1	00,01			**
			2	00 index=7			
		No Object (Cold Restart)	13				
		No Object (Warm Restart)	14				
		No Object (Delay Measurement)	23				

2. Time synchronization information

Parameter	Time
Maximum time base drift over a 10 minute interval	See the ION7400 datasheet for the most current specifications.
Maximum difference between meter time base and master station time base after time set from DNP protocol	2s
Maximum delay measurement error	200ms

2.1 Time Sync Request Configuration

The time interval which the device waits before requesting a time sync from the master (using IIN1-4) is configurable from 1 second to 1 day (in 1 second intervals). The factory default is 1 day.

A Setup option in the DNP Slave Options ION Module is used to configure the Time Sync Request period.

2.2 Configuring DNP communications port to accept time synchronization

Setup options in the ION Clock Module need to be configured before DNP Time Syncs can be processed correctly:

- TimeSyncSource identifies the communications port running the DNP Protocol.
- TimeSyncType indicates if the time syncs are sent in local time or universal time format.

3. ION7400 default DNP configuration

ION7400 meters are shipped from the Factory with the following DNP static objects defined. These objects are returned in response to a Class 0 Poll. Note that the protocol of the desired communications port must be set to “DNP 3.0” before the meter will respond to DNP master requests.

Analog Input Objects

(16-Bit Analog Input without Flag)
(Object 30, Variation 4)

Point	Measurement	Scaling
0	Vln a	x1
1	Vln b	x1
2	Vln c	x1
3	Vln avg	x1
4	Vll ab	x1
5	Vll bc	x1
6	Vll ca	x1
7	Vll avg	x1
8	I a	x1
9	I b	x1
10	I c	x1
11	I avg	x1
12	kW a	x1
13	kW b	x1
14	kW c	x1
15	kW tot	x1
16	kVAR a	x1
17	kVAR b	x1
18	kVAR c	x1
19	kVAR tot	x1
20	kVA a	x1
21	kVA b	x1
22	kVA c	x1
23	kVA tot	x1
24	PFsign a	x1
25	PFsign b	x1
26	PFsign c	x1
27	PFsign tot	x1
28	**V unbal**	**x10**
29	**I unbal**	**x10**
30	I4	x1
31	**Freq**	**x10**
32	kW sd del-rec[2]	x1
33	kVAR sd del-rec[2]	x1
34	kVA sd del+rec[2]	x1

Binary Counter Objects

(16-Bit Binary Counter without Flag)
(Object 20, Variation 6)

Point	Measurement	Scaling
0	kWh del (Import)	x1
1	kWh rec (Export)	x1
2	kWh del+rec (Total)	x1
3	kWh del-rec (Net)	x1
4	kVARh del (Import)	x1
5	kVARh rec (Export)	x1
6	kVARh del+rec (Total)	x1
7	kVARh del-rec (Net)	x1
8	kVAh del+rec (Total)	x1

[2] Note : These are instantaneous demand quantities, not peak (maximum) demand.

4. Details on customizing DNP v3.0 configuration

The ION7400 is factory configured with the basic DNP objects as outlined in “ION7400 default DNP configuration” on page 16. The ION7400 DNP configuration can be further customized to take advantage of other DNP features.

4.1 Customizing the DNP Point map

Your meter’s digital and analog outputs may change state when being configured, during an option module reset or power cycle, or during firmware or framework upgrade.

⚠ WARNING

HAZARD OF UNINTENDED OPERATION

Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

Failure to follow these instructions can result in death or serious injury.

The ION7400 configuration can be modified to define which measurements are mapped to DNP Static points – this allows a user to control the number of objects returned in a Class 0 poll. ION Modules are used to map ION7400 measurements to DNP points as follows:

- Up to 100 ION7400 measurements can be mapped to DNP Static points. The DNP Slave Export ION Module is used to map ION7400 measurements to DNP Binary Input, Binary Counter, or Analog Input points. A DNP Static point is defined for each ION7400 measurement that is “linked” to a DNP Slave Export ION Module. The type of DNP Static point is a setup option of the DNP Slave Export ION Module.

- Up to 16 relays can be controlled through DNP. The DNP Slave Import ION Module is used to map DNP Control Relay Output Block, and Analog Output Block points to ION7400 relay and analog output hardware.

4.2 Report-by-exception processing (DNP Events)

Any DNP Static point can be configured to create DNP Event objects on value changes. Binary Input Change Events are created when a DNP Binary Input point changes state. Counter and Analog Change Event objects are created when the corresponding Static object changes by more than a programmable deadband value. Deadbands can be set on a per-object basis. Further, Event objects can be assigned as either Class 1, Class 2, or Class 3 on a per-object basis.

Setup options in the DNP Slave Export ION Module are used to enable Events, define deadband values, and assign DNP Event Classes.

Setup options in the DNP Slave Options ION Module are used to select the Object/Variations of Events that will be produced.

The “scan time” for Binary Counter and Analog Input Points is 1 second.

The “scan time” for Binary Input Points is 20ms.

Event capacities are:

- Binary Input Change Events – 25 events
- Frozen Counter Events – 25 events
- Counter Change Events – 25 events
- Frozen Analog Input Events – 25 events
- Analog Input Change Events – 50 events

4.3 Control Relay Output Block

Your meter’s digital and analog outputs may change state when being configured, during an option module reset or power cycle, or during firmware or framework upgrade.

⚠ WARNING

HAZARD OF UNINTENDED OPERATION

Do not use the meter for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

Failure to follow these instructions can result in death or serious injury.

Both ‘1 point per address’ and ‘2 points per address’ modes of addressing are supported for Control Relay Output Block objects. A setup option in the DNP Slave Import ION Module selects the addressing mode. Up to 10 CROB requests can be requested in a single message.

4.4 Freezing Binary Counter Points

Any DNP Binary Counter Point can be configured to support the freeze command. When a Binary Counter is frozen it copies its value into a DNP Frozen Counter point. These Frozen Counter points are returned in a Class 0 poll. Freeze, Freeze/Clear, Freeze/No-Ack, and Freeze/Clear/No-Ack functions are supported.

A Setup option in the DNP Slave Export ION Module is used to give freeze capabilities to the associated Static point.

A Setup option in the DNP Slave Options ION Module is used to select the Object/Variation of the Frozen Static object.

4.5 Scaling

Counter and Analog Input objects can be scaled on a per-object basis. Scaling can be used to maintain resolution in floating point measurements. For example, Frequency measurements can be multiplied by 10 to obtain 1 decimal place of resolution. Alternatively, for Analog Input objects, floating point variations can be requested to maintain multiple decimal places of resolution.

4.6 Assigning ION DNP Slave Options Modules to Meter Communication Ports

The ION DNP Slave Options Module contains a CommPort setup register that assigns this ION DNP Slave Options Module to a particular communication port. Only the settings in the assigned ION DNP Slave Options Module have any effect on that communications port.

For TCP/IP connections (port is set to Ethernet) the MasterIP Addr setup register is used to differentiate between the connections. Setting a specific IP address in this register allows only that IP address to connect to this session. If the register is set to None or left blank, any IP address can connect and use the session.

For more information see the Multiport DNP 3.0 and ION Technology technical note, available from www.schneider-electric.com.

5. Glossary of terms

Application	A piece of software (a program) consisting of one or more processes and supporting functions.
Binary	A number system having only two symbols (1 and 0), and where values are expressed in the base two number system.
Bit	Abbreviation of binary digit. The smallest unit of information in a binary system. Has a value of either one (1) or zero (0).
Master	The client or host station or computer, with which the RTU equipment communicates. Also referred to as a host or host computer.
Non-volatile random-access memory	A semi-permanent type of data storage (memory) that is backed up by batteries to maintain stored data even if system power is lost. Can be both read and changed by the system. Abbreviated as NVRAM.
Random-access memory	A type of temporary data storage (memory) that can be read and changed while the computer is in use. Data stored in random-access memory is lost if the system loses power. Abbreviated as RAM.
Remote terminal unit	A piece of equipment located at a distance from a master station to monitor and control the status of outlying equipment, and to communicate the information back to the master station or host. Abbreviated as RTU.
Sequence of events	A time-tagged change of state, logged as part of a chronological record of significant changes in the condition of a particular point or points being monitored. Abbreviated as SOE.

6. List of acronyms and abbreviations

DNP	distributed network protocol
IED	intelligent electronic device
NVRAM	non-volatile random-access memory
OSI	open systems interconnect
RAM	random-access memory
RTU	remote terminal unit
SOE	sequence of events