

12.3 DNP 3.0 Slave

Default group and variation sets are used to send static and event values. If master devices support different groups and variations, they can be adjusted in Excel configuration. WCC Lite supported variations are provided in *Static and Event variations* and *Command variations*.

DNP3 Slave parameters for Devices tab

Parameter	Type	Description	Required		Default Value (when not specified)	Range	
			TCP/ TLS	RTU		Min	Max
name	string	User-friendly device name	Yes	Yes			
description	string	Description of a device	No	No			
device_alias	string	Alphanumeric string to identify a device	Yes	Yes			
enable	boolean	Enabling/disabling of a device	No	No	1	0	1
protocol	string	Protocol to be used.	Yes	Yes		dnp3 tcp slave dnp3 serial slave	
mode	string	Choosing between TCP, TLS and SERIAL modes. If protocol provided DNP3 TCP mode defaults to tcp and if DNP3 serial is provided mode defaults to SERIAL	No	No	TCP or SERIAL	TCP, SERIAL, TLS	
host	string	IP address of TCP slave device	Yes	-			
bind_address	string	IP address of network adapter used to connect to slave device	No	-	0.0.0.0		
port	integer	TCP communication port	No	-	20000		
device	string	Communication port ("PORT1" or "PORT2")	-	Yes			
baudrate	integer	Communication speed, bauds/s	-	No	9600	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600,115200	
databits	integer	Data bit count for communication	-	No	8	6	9
stopbits	integer	Stop bit count for communication	-	No	1	1	2
parity	string	Communication parity option	-	No	none	none, even, odd	
flowcontrol	string	Communication device flow control option.	-	No	none	none	

tls	boolean	Enable/disable use of TLS	Yes (for TLS)	-	0	0	1
tls_local_certificate	string	Local certificate for TLS connection	Yes (for TLS)	-			
tls_peer_certificate	string	Certificate authority file for TLS connection	No (for TLS)	-			
tls_private_key	string	File consisting of private key for TLS connection	No (for TLS)	-			
max_tx_frag_size	integer	Maximum size of a received fragment.	No	No	2048	0	2048
destination_address	integer	Address of a master station	No	No	1	0	65535
source_address	integer	Address of a slave (local) station.	No	No	1	0	65535
unsol_classes	string	Defines which classes will have unsolicited actions on startup. (Example: "1,3,2")	No	No	no class	1	3
time_sync_interval_sec	integer, string	Periodic time sync interval in seconds. If 0 < - time syncs are forced and periodic. If = 0 - time syncs react to IIN bits from slave. If < 0 - time syncs are disabled.	No	No	0	0	
select_ms	integer	Select command timeout. Valid for all signals.	No	No	10000		
timeout_ms	integer	Response timeout in milliseconds	No	No	2000		
keep_alive_timeout	integer	Time interval for sending a keep alive packet in milliseconds.	No	No	60		

DNP3 Slave parameters for Signals tab

Parameter	Type	Description	Required		Default Value (when not specified)	Range	
			TCP	RTU		Min	Max
signal_name	string	User-friendly signal name	Yes	Yes			
device_alias	string	Device alias from a Devices tab	Yes	Yes			
signal_alias	string	Unique alphanumeric name of the signal to be used	Yes	Yes			

enable	boolean	Enabling/disabling of a device	No	No	1	0	1
index	integer	Index of a signal.	Yes	Yes		0	65535
log	boolean	Enable logging in event log	No	No	0	0	
deadband	integer, string	Deadband for Analog, Analog Output Status, Counter, Frozen Counter signals.	No	No	0		
signal_type	string	DNP3 signal type. (case insensitive)	Yes	Yes		"binary", "doublebitbinary", "binaryoutputstatus", "binaryoutputcommand", "counter", "frozencounter", "analog", "analogoutputstatus", "analogoutputcommand", "timeandinterval", "octetstring"	
command_variation	integer	DNP3 command variation. <i>Supported variations depend on signal type and are provided in table below</i>	No	No	1	0	4
static_variation	integer	Override default signal's static variation. Valid for Status mode signals.	No	No		0, 1, 2, 3, 4, 5, 6, 9, 10	
event_variation	integer	Override default signal's event variation. Valid for Status mode signals.	No	No		0	8
control_code	string	DNP3 control model code of CROB signal. TripClose and Pulse controlmodel requires PulseOn/off times to be set	Yes	Yes		LATCH, PULSE, TRIPCLOSE	
pulse_on_time_ms	integer	Pulse ON time in milliseconds, when using Pulse or TripClose control models must be set	Yes	Yes			
pulse_off_time_ms	integer	Pulse OFF time in milliseconds, when using Pulse or TripClose control models must be set	Yes	Yes			
class_num	integer	Class assignment of this signal.	No	No	0	0	3
operate_type	integer	Default command behaviour. If selected: "-1" - DirectOperateNoAck (FC=6), "0" - DirectOperate (FC=5), "1" - SelectBeforeOperate (FC=3).	No	No	1	-1	1
job_todo	string	Device status signal can be configured by providing one of the given values. 	No	No		communication_status, device_running, device_error, unknown_error	

Device status signals

To configure any device status signal for DNP3 protocol additional **job_todo** column is required. For DNP3 slave required parameters for status signal will be: **signal_name**, **device_alias**, **signal_alias**, **index**, **signal_type**, **event_variation** (1,2 or 3) and **job_todo**. There are 4 possible signals: communication_status, device_running, device_error, unknown_error. Each signal has 4 possible values and are based on the same logic. If signal returns value of 0, it means unknown error has appeared, 1 – device or protocol connection is on and working properly, 2 – device is off or protocol is disconnected, 3 – error or service is down.

Command variations

Signal Type	Available Command Variation	Default Command Variation
Binary Output Command (Group12)	0, 1	1
Analog Output Command (Group41)	0, 1, 2, 3, 4	1

Static and Event variations

Signal Type	Available Variations	Default Variations
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Binary	Static variation (Group1) 1, 2 Event variation (Group2) 1, 2, 3	Static variation 2 Event variation 1
Double Binary	Static variation (Group3) 2 Event variation (Group4) 1, 2, 3	Static variation 2 Event variation 1
Binary Output Status	Static variation (Group10) 2 Event variation (Group11) 1, 2	Static variation 2 Event variation 1
Counter	Static variation (Group20) 1, 2, 5, 6 Event variation (Group22) 1, 2, 5, 6	Static variation 1 Event variation 1
Frozen Counter	Static variations (Group21) 1, 2, 5, 6, 9,10 Event variation (Group23) 1, 2, 5, 6	Static variation 1 Event variation 1
Analog	Static variation (Group30) 1, 2, 3, 4, 5, 6 Event variation (Group32) 1, 2, 3, 4, 5, 6, 7, 8	Static variation 1 Event variation 1
Analog Output Status	Static variation (Group40) 1, 2, 3, 4 Event variation (Group42) 1, 2, 3, 4, 5, 6, 7, 8	Static variation 1 Event variation 1
Time and Interval	Static variation (Group50) 1	Static variation 1
Octet String	Static variation (Group110) 0 Event variation (Group111) 0	Static variation 0 Event variation 0

Debugging the DNP3 Slave service

If configuration for DNP3 devices is set up, handler for protocol will start automatically. If configuration is missing or contains errors, protocol will not start. It is done intentionally decrease unnecessary memory usage.

DNP3 protocol runs a service called **dnp3-slave**. If DNP3 does not work properly (e.g. no communication between devices, data is corrupted, etc.), a user can launch a debug session from command line interface and find out why link is not functioning properly. To launch a debugging session, a user should stop **dnp3-slave** process and run **dnp3-slave** command with respective flags as in the table given below.

Procedure for DNP3 Master protocol service debugging:

- **Step 1:** Service must be stopped by entering the following command into the wccliite:
/etc/init.d/dnp3-slave stop
- **Step 2:** After service is stopped it must be started with the preferred configuration file (JSON files found in /etc/ folder) and a debug level 7: **dnp3-slave -c /etc/dnp3-slave/dnp3slave.json -d7** Additional output forming options described in the table below.
- **Step 3:** Once the problem is diagnosed normal operations can be resumed with the following command:
/etc/init.d/dnp3-slave start

dnp3-slave command line debugging options

Option	Description
-h [-help]	Display help information
-V [-version]	Show version
-p [-port]	Show output for one port only
-d <debug level>	Set debugging level
-c [-config]	Config path
-a [-app]	Show application layer data
-l [-link]	Show link layer data
-t [-transport]	Show transport layer data
-r [-redis]	Show Redis messages
-R [-readyfile]	Ready notification file

