

BACNET OBJECT LIST

1.1. Object Types Supported

The following table lists the object types supported by the WattsOn-MCM. They are referred to elsewhere in this document by their abbreviation.

Abbreviation	Object Type
AI	Analog Input
BI	Binary Input
MSI	Multi-State Input
DTV	Date/Time Value
CSV	Character String Value
F	File
SV	Structured View

1.2. Object Details

This section describes each BACnet object in detail.

1.2.1. Device Status Objects

These objects represent the status of the WattsOn-MCM as a whole.

Type	Object Name	Instance (decimal)	Instance (hex)	R/W	Comments
MSI	active_connection	300	0x12C	R	Currently active network connection. 1 = Ethernet, 2 = Wi-Fi, 3 = Wi-Fi Access Point
CS	active_ip	300	0x12C	R	Currently active IP address
CS	active_nm	301	0x12D	R	Currently active network mask
CS	active_gw	302	0x12E	R	Currently active default gateway
CS	active_dns0	303	0x12F	R	Currently active DNS server (primary)
CS	active_dns1	304	0x130	R	Currently active DNS server (backup)
CS	eth_mac	305	0x131	R	Ethernet MAC address/Cloud ID
CS	wifi_mac	306	0x132	R	Wi-Fi MAC address
DTV	utc_datetime	300	0x12C	R	Current date/time, as determined by NTP or by battery backup (certain models only).
BSV	cards_present	600	0x258	R	A bitfield indicating which slots have cards installed. If the i^{th} bit is set, there is a card in slot $i+1$.
BSV	fault_code	601	0x259	R	A bitfield indicating any fault conditions that the WattsOn-MCM is experiencing. Each bit represents a different fault; multiple faults can be present simultaneously. Bit 0: <i>reserved</i> Bit 1: card fault (see card_fault) Bit 2: no cards installed/detected Bit 3: communication fault (can't communicate with cards) Bit 4: voltage fault Bit 5: no voltage interface installed Bit 6: one or more cards missing (see missing_fault)
BSV	card_fault	602	0x25A	R	A bitfield indicating any cards have a fault condition. If the i^{th} bit is set, there is a fault in card $i+1$.
BSV	voltage_fault	603	0x25B	R	A bitfield indicating any cards that have a voltage fault (they are reading a voltage that doesn't match the voltage interface). If the i^{th} bit is set, the card in slot $i+1$ has a voltage fault.
BSV	missing_fault	604	0x25C	R	A bitfield indicating which cards are unexpectedly missing. Note that a card is only considered "missing" if it had previously been present and configured. If the i^{th} bit is set, the card in slot $i+1$ is considered missing.

1.2.2. Device Setting Objects

These objects represent the WattsOn-MCM's settings. These are read-only in BACnet for security reasons, but can be changed via the web interface, either directly via System → Advanced Configuration (where they have the same names as in the table below), or indirectly via the more user-friendly pages of the web interface.

Type	Object Name	Instance (decimal)	Instance (hex)	R/W	Comments
CSV	mbtcp_port	3009	—	R	Port # for the Modbus TCP server
CSV	http_port	3010	—	R	Port # for the HTTP server
CSV	api_udp_port	3013	—	R	Port # for the UDP API
BI	post_en	3015	—	R	Posting enabled. Valid range: 0 to 1.
CSV	post_seconds	3016	—	R	Posting interval, in seconds. Valid range: 1 to 999999999.
BI	post_auth_en	3017	—	R	Posting authorization enabled. Valid range: 0 to 1.
CSV	post_timeout_s	3018	—	R	Amount of time to wait for a response to a web post before giving up. Valid range: 1 to 1000000.
BI	post_buf_en	3019	—	R	Post buffering enabled. Valid range: 0 to 1.
CSV	post_buf_limit	3020	—	R	Percentage of the flash to use as buffer space. Valid range: 1 to 100.
BI	ntp_en	3021	—	R	Network Time Protocol enabled. Valid range: 0 to 1.
CSV	ntp_listen_port	3022	—	R	Port to listen on for NTP
CSV	ntp_port_0	3023	—	R	Port of the primary NTP server
CSV	ntp_port_1	3024	—	R	Port of the secondary NTP server
CSV	ntp_port_2	3025	—	R	Port of the tertiary NTP server
CSV	ntp_rate_m	3026	—	R	Frequency to update NTP time. Valid range: 30 to 65535.
CSV	ntp_timeout_ms	3027	—	R	Amount of time to wait for an NTP response before giving up. Valid range: 10 to 65535.
CSV	ntp_retry_ms	3028	—	R	Amount of time to wait before retrying an NTP request. Valid range: 10 to 65535.
CSV	eth_static_ip	3029	—	R	Statically assigned Ethernet IP
CSV	eth_static_nm	3030	—	R	Statically assigned Ethernet network mask
CSV	eth_static_gw	3031	—	R	Statically assigned Ethernet default gateway
CSV	eth_static_dn0	3032	—	R	Statically assigned Ethernet DNS server (primary)
CSV	eth_static_dn1	3033	—	R	Statically assigned Ethernet DNS server (backup)
CSV	wifi_static_ip	3034	—	R	Statically assigned Wi-Fi IP
CSV	wifi_static_nm	3035	—	R	Statically assigned Wi-Fi network mask
CSV	wifi_static_gw	3036	—	R	Statically assigned Wi-Fi default gateway
CSV	wifi_static_dn0	3037	—	R	Statically assigned Wi-Fi DNS server (primary)
CSV	wifi_static_dn1	3038	—	R	Statically assigned Wi-Fi DNS server (backup)
CSV	http_sto_ms	3040	—	R	HTTP send timeout (ms). Valid range: 1 to 1000000.
CSV	http_rto_ms	3041	—	R	HTTP receive timeout (ms). Valid range: 1 to 1000000.
CSV	auto_reboot_s	3042	—	R	Time, in seconds, after which the device automatically reboot. 0 indicates that this feature is disabled.
CSV	reconnect_s	3043	—	R	If no network connection is obtained after this time (s), reboot the device. Valid range: 1 to 1000000.
CSV	wifi_chan_start	3048	—	R	First valid Wi-Fi channel. Configure according to regional laws. Valid range: 1 to 14.
CSV	wifi_chan_count	3049	—	R	Number of Wi-Fi channels to use. Configure according to regional laws. Valid range: 1 to 14.
CSV	wifi_max_tx_pwr	3050	—	R	Wi-Fi transmit power, as a percentage of maximum. Valid range: 1 to 100.
CSV	bac_port	3070	—	R	Port # of the BACnet server
CSV	bac_instance	3071	—	R	Instance # of the BACnet device object. -1 indicates that it will be automatically generated from the MAC.
BI	mbtcp_en	3073	—	R	Modbus TCP server enabled. Valid range: 0 to 1.
CSV	bac_apdu_max	3074	—	R	MAX APDU size of BACnet packets.
CSV	bac_frqn_reg_ip	3075	—	R	IP address of BBMD to register with. All zeroes indicates not to register.

CSV	bac_frqn_reg_s	3076	—	R	TTL of BACnet BBMD registration. Valid range: 30 to 65535.
BI	bac_segment_en	3077	—	R	BACnet segmentation enabled. Valid range: 0 to 1.
CSV	bac_seg_to_ms	3078	—	R	BACnet segmentation timeout (ms). Valid range: 10 to 60000.
BI	mqtt_retain_en	3079	—	R	Use MQTT Retain flag. Valid range: 0 to 1.
CSV	mqtt_max_flying	3080	—	R	Number of MQTT packets to send before waiting for an acknowledgement.
CSV	mqtt_version_id	3081	—	R	MQTT protocol version code to use. Valid values are 4 for MQTT v3.1.1, or 5 for MQTT v5.
BI	mqtt_no_cid_en	3082	—	R	Allow an empty Client ID; supporting servers can assign one to the device (MQTT v5). Valid range: 0 to 1.
BI	mqtt_en	3083	—	R	MQTT Enabled. Valid range: 0 to 1.
BI	mqtt_persist_en	3084	—	R	MQTT persistent connections. Posting intervals < 300 seconds will re-use the same TCP connection if possible. Valid range: 0 to 1.
BI	mqtt_aliases_en	3085	—	R	MQTT aliases enabled (MQTT v5) for saving bandwidth. Valid range: 0 to 1.
MSI	eth_mode	3202	—	R	Ethernet mode. 0 = static, 1 = DHCP.
MSI	wifi_mode	3203	—	R	Wi-Fi mode. 0 = static, 1 = DHCP.
CSV	name	3250	—	R	Device friendly name. Max length: 32 characters
CSV	wifi_ssid	3251	—	R	Wi-Fi SSID. Max length: 33 characters
CSV	post_url	3254	—	R	Posting URL. Max length: 256 characters
CSV	post_auth_user	3255	—	R	Posting authorization username, used for HTTP and MQTT. Max length: 32 characters
CSV	ntp_server_0	3257	—	R	Primary NTP server URL. Max length: 64 characters
CSV	ntp_server_1	3258	—	R	Secondary NTP server URL. Max length: 64 characters
CSV	ntp_server_2	3259	—	R	Tertiary NTP server URL. Max length: 64 characters
CSV	post_file_0	3260	—	R	Filename of template used to generate first post. Max length: 64 characters
CSV	post_file_1	3261	—	R	Filename of template used to generate first post. Max length: 64 characters
CSV	post_file_2	3262	—	R	Filename of template used to generate first post. Max length: 64 characters
CSV	post_file_3	3263	—	R	Filename of template used to generate first post. Max length: 64 characters
CSV	post_file_4	3264	—	R	Filename of template used to generate first post. Max length: 64 characters
CSV	post_method	3270	—	R	HTTP verb to use when posting (GET, PUT, POST, etc.) Max length: 32 characters
CSV	post_headers	3271	—	R	Additional headers to include in HTTP post. Each line must be terminated with \r\n. Max length: 256 characters
CSV	post_ct	3272	—	R	Content Type of HTTP posts. Max length: 32 characters
CSV	http_headers	3273	—	R	Additional headers to use for HTTP server responses. Each line must be terminated with \r\n. Max length: 256 characters
CSV	wifi_country	3279	—	R	Country code for Wi-Fi. WW indicates non-specific country (worldwide). Max length: 3 characters
CSV	post_addr_0	3350	—	R	URL of the first web post. Max length: 32 characters
CSV	post_addr_1	3351	—	R	URL of the first web post. Max length: 32 characters
CSV	post_addr_2	3352	—	R	URL of the first web post. Max length: 32 characters
CSV	post_addr_3	3353	—	R	URL of the first web post. Max length: 32 characters
CSV	post_addr_4	3354	—	R	URL of the first web post. Max length: 32 characters

1.2.3. Custom User Register Objects

These objects represent custom user registers defined on the User Registers page of the web interface. Because they are defined and named by the user, the object names are not listed in the table, and only registers actually defined are accessible. If the user register is named with a unit in brackets at the end, such as "Total Power (kW)", the WattsOn-MCM will attempt to translate that into the correct BACnet unit code (48 for kilowatts); this is only supported for units that are used elsewhere in other objects on the WattsOn-MCM.

Type	Object Names	Instance (decimal)	Instance (hex)	R/W	Comments
AI	(user-defined)	0	0x0	R	User-defined BACnet object
AI	(user-defined)	1	0x1	R	User-defined BACnet object
AI	(user-defined)	2	0x2	R	User-defined BACnet object
		⋮			
AI	(user-defined)	99	0xC7	R	User-defined BACnet object

1.2.4. Card Parameter Objects

These objects represent data points from the cards installed in the WattsOn-MCM. Many of these objects are only available if (a) a card is installed in the corresponding slot of the WattsOn-MCM, and (b) that card supports the corresponding parameter. Because of the large number of potential objects — a WattsOn-MCM with enough cards installed contains over 1,000 BACnet objects — these objects are listed in the table as a group, and only the first instance number is listed. Additional objects in the group have consecutive object numbers.

Each parameter has a "Parameter ID" number. Parameter objects start at instance number 0x20000 (131072 in decimal).

Some parameters have one object per card. These objects are listed in the table with an "n" in their name, which is a variable representing the card number (1-20). The instance number can be determined using the following formula:

$$131072 + [(Parameter\ ID - 1) \times 256] + (Card\ Number - 1)$$

Some parameters have one object per channel, rather than per card. These objects are listed in the table with an "m" in their name, which is a variable representing the channel number (1-60). They may also have an "ni" in their name, representing the card number (1-20) and the card channel (A, B, C). The instance number can be determined using the following formula:

$$131072 + [(Parameter\ ID - 1) \times 256] + (Channel\ Number - 1)$$

Some parameters have multiple objects per card or per channel; these objects are listed in the table with an "x" in their name. See their description for details.

Example 1: The parameter named "P11-04 Power 04 (02A)" represents the real power for WattsOn-MCM channel 4, which is the "A" channel of the card in slot 2 (each card has three channels, A, B, and C). This parameter only exists if a MeasureCard is installed in slot 2. The table below lists the starting instance of Power objects, in hexadecimal, as 0x20A00, or 133632 in decimal. The 4th power object is at address 0x20A00 + 4 - 1, or 0x20A03 (or 133635 in decimal).

Example 2: The parameter named "P24-04 Energy Exp 04 (02A)" represents the exported energy for WattsOn-MCM channel 4, which is the "A" channel of the card in slot 2 (each card has three channels, A, B, and C). Only some models of MeasureCards support this parameter, such as model numbers beginning with WMC-PM-P. This parameter only exists if a MeasureCard supporting this parameter is installed in slot 2. The table below lists the starting instance of Energy Exp objects, in hexadecimal, as 0x21700, or 136,960 in decimal. The 4th power object is at address 0x21700 + 4 - 1, or 0x21703 (or 136,963 in decimal).

Type	Parameter ID	Max Objects	Object Names	1 st Instance (decimal)	1 st Instance (hex)	Units	R/W	Comments
CSV	01	20	P01- n Name n	131072	0x20000	—	R	Friendly name of card in slot n
CSV	02	20	P02- n ClassName n	131328	0x20100	—	R	Type of card in slot n
CSV	03	20	P03- n PartNumber n	131584	0x20200	—	R	Part number of card in slot n
AI	05	20	P05- n ClassID n	132096	0x20400	—	R	Type ID of card in slot n
AI	06	20	P06- n Serial n	132352	0x20500	—	R	Serial number of card in slot n
AI	07	20	P07- n HWVersion n	132608	0x20600	—	R	Hardware version of card n
AI	08	20	P08- n FWVersion n	132864	0x20700	—	R	Firmware version of card n
AI	09	120	P09- x ChanName/Note m (ni)	133120	0x20800	—	R	Text name/note of channel m . Names and notes are interleaved; even-numbered objects are names, odd-numbered objects are notes.
AI	10	60	P10- m Current m (ni)	133376	0x20900	amperes (3)	R	Current of channel m
AI	11	60	P11- m Power m (ni)	133632	0x20A00	kilowatts (48)	R	Real Power of channel m
AI	12	60	P12- m PF m (ni)	133888	0x20B00	power-factor (15)	R	Power factor of channel m
AI	13	60	P13- m Energy m (ni)	134144	0x20C00	kilowatt-hours (19)	R	Net energy of channel m
AI	14	60	P14- m React Pwr m	134,400	0x20D00	kilovolt-amperes-reactive (9)	R	Reactive power of channel m . Only supported on some cards.
AI	15	60	P15- m Apprnt Pwr m	134,656	0x20E00	kilovolt-amperes (12)	R	Apparent power of channel m . Only supported on some cards.
AI	16	60	P16- x CTRatioPrimary/Secondary m (ni)	134912	0x20F00	—	R	CT ratio of channel m . CT ratio primaries and secondaries are interleaved. For example, for the ratio 1000:1, the first object will contain the value 1000, and the second object contains the value 1.
AI	17	60	P17- m Phase Comp m (ni)	135168	0x21000	—	R	CT phase compensation value of channel m , in hundredths of a degree
BSV	18	20	P18- n Chan Cfg n	135424	0x21100	—	R	Channel configuration bitmask of card n . This is a 6-bit value, with each 2-bit pair indicating "disabled" (00), "A" (01), "B" (02), or "C" (03).
AI	23	60	P23- m Energy Imp m	136,704	0x21600	kilowatt-hours (19)	R	Import energy of channel m . Only supported on some cards.
AI	24	60	P24- m Energy Exp m	136,960	0x21700	kilowatt-hours (19)	R	Export energy of channel m . Only supported on some cards.

1.2.5. Voltage Interface Parameter Objects

These objects pertain to the WattsOn-MCM's voltage interface module, the MCM-V.

Type	Object Name	Instance (decimal)	Instance (hex)	Units	R/W	Comments
AI	P19-121 Voltage Va	135800	0x21278	volts (5)	R	Line-to-neutral voltage of voltage A
AI	P19-121 Voltage Vb	135801	0x21279	volts (5)	R	Line-to-neutral voltage of voltage B
AI	P19-121 Voltage Vc	135802	0x2127A	volts (5)	R	Line-to-neutral voltage of voltage C
AI	P19-121 Voltage Va-Vb	135803	0x2127B	volts (5)	R	Line-to-line voltage of Va-Vb
AI	P19-121 Voltage Vb-Vc	135804	0x2127C	volts (5)	R	Line-to-line voltage of Vb-Vc
AI	P19-121 Voltage Vc-Va	135805	0x2127D	volts (5)	R	Line-to-line voltage of Vc-Va
AI	P20-021 Frequency VI	135956	0x21314	hertz (27)	R	Line frequency, taken from the first voltage channel that a valid sinusoidal wave is detected on
AI	P21-121 PTRatioPrimary Va	136312	0x21478	—	R	PT ratio primary for voltage A
AI	P21-122 PTRatioSecondary Va	136313	0x21479	—	R	PT ratio secondary for voltage A
AI	P21-123 PTRatioPrimary Vb	136314	0x2147A	—	R	PT ratio primary for voltage B

AI	P21-124 PTRatioSecondary Vb	136315	0x2147B	—	R	PT ratio primary for voltage B
AI	P21-125 PTRatioPrimary Vc	136316	0x2147C	—	R	PT ratio primary for voltage C
AI	P21-126 PTRatioSecondary Vc	136317	0x2147D	—	R	PT ratio secondary for voltage C
AI	P22-061 VAngle Va	136508	0x2153C	—	R	Phase angle of voltage A
AI	P22-062 VAngle Vb	136509	0x2153D	—	R	Phase angle of voltage B
AI	P22-063 VAngle Vc	136510	0x2153E	—	R	Phase angle of voltage C

1.2.6. File System Objects

These objects represent files on the device's internal filesystem.

Type	Object Name	Instance (decimal)	Instance (hex)	R/W	Comments
F	/spiffs/template.json	10	0xA	R	File object representing the posting template file
F	/spiffs/registers.json	20	0xB	R	File object representing the custom registers file

1.2.7. Structured View Objects

These objects represent logical groupings of the device's other objects. Some BACnet programs use these to logically organize objects in a tree structure. They are usually not useful to an end user.

(i) Static objects

These objects are always available.

Type	Object Name	Instance (decimal)	Instance (hex)	R/W	Comments
SV	User Registers	0	0x0	R	Groups objects representing custom registers defined by the user in the device's web interface
SV	Settings	1	0x1	R	Groups objects related to the device's networking module
SV	Status	5	0x5	R	Groups objects representing device status information
SV	Filesystem	6	0x6	R	Groups objects representing files stored on the filesystem
SV	Cards	7	0x7	R	Groups objects by card
SV	Electrical Parameters	8	0x8	R	Groups objects by parameter
SV	Voltage Interface	52	0x34	R	Groups objects pertaining to the MCM-V, the voltage interface
SV	P10 Current	137	0x89	R	Groups objects representing current values for individual channels
SV	P11 Power	138	0x8A	R	Groups objects representing real power values for individual channels
SV	P12 PF	139	0x8B	R	Groups objects representing power factor values for individual channels
SV	P13 Energy	140	0x8C	R	Groups objects representing net energy values for individual channels
SV	P14 React Pwr	141	0x8D	R	Groups objects representing reactive power values for individual channels
SV	P15 Apprnt Pwr	142	0x8E	R	Groups objects representing apparent power values for individual channels
SV	P16 CT Ratio	143	0x8F	R	Groups objects representing CT ratio values for individual channels
SV	P17 Phase Comp	144	0x90	R	Groups objects representing phase compensation values for individual channels
SV	P18 Chan Cfg	145	0x91	R	Groups objects representing channel configuration values (which map particular voltage channels to current channels)
SV	P23 Energy Imp	150	0x96	R	Groups objects representing import energy values for individual channels
SV	P24 Energy Exp	151	0x97	R	Groups objects representing export energy values for individual channels

(ii) Dynamic card objects

These objects are only available if a card is installed in the corresponding slot.

Type	Object Name	Instance (decimal)	Instance (hex)	R/W	Comments
SV	Card 1	32	0x20	R	Objects pertaining to a particular card
SV	Card 2	33	0x21	R	Objects pertaining to a particular card
SV	Card 3	34	0x22	R	Objects pertaining to a particular card
SV	Card 4	35	0x23	R	Objects pertaining to a particular card
SV	Card 5	36	0x24	R	Objects pertaining to a particular card
SV	Card 6	37	0x25	R	Objects pertaining to a particular card
SV	Card 7	38	0x26	R	Objects pertaining to a particular card
SV	Card 8	39	0x27	R	Objects pertaining to a particular card
SV	Card 9	30	0x28	R	Objects pertaining to a particular card
SV	Card 10	41	0x29	R	Objects pertaining to a particular card
SV	Card 11	42	0x2A	R	Objects pertaining to a particular card
SV	Card 12	43	0x2B	R	Objects pertaining to a particular card
SV	Card 13	44	0x2C	R	Objects pertaining to a particular card
SV	Card 14	45	0x2D	R	Objects pertaining to a particular card
SV	Card 15	46	0x2E	R	Objects pertaining to a particular card
SV	Card 16	47	0x2F	R	Objects pertaining to a particular card
SV	Card 17	48	0x30	R	Objects pertaining to a particular card
SV	Card 18	49	0x31	R	Objects pertaining to a particular card
SV	Card 19	50	0x32	R	Objects pertaining to a particular card
SV	Card 20	51	0x33	R	Objects pertaining to a particular card