# BACnet Application Map for Network Management Card for Easy UPS, 3-Phase

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## Introduction

This document details the BACnet objects and properties supported by the Network Management Card for Easy UPS, 3-Phase devices, available on the APC website.

## Additional Information

- Information on the BACnet protocol specification can found at www.bacnet.org.
- APC recommends EcoStruxure Building Operation software (formerly known as StruxureWare Building Operation/SBO) for integrated monitoring, control and management of BACnet-enabled devices.
- See the Network Management Card for Easy UPS User Guide available on the APC website for more information on configuring the NMC for BACnet.
- The Network Management Card for Easy UPS, 3-Phase (AP9547) supports BACnet/IP only.

# Analog Value Objects

Analog value objects provide information on UPS data properties made available via the BACnet protocol:

- BACnet Units – the format of the analog (numeric) values returned. The unit format complies with the BACnet standard, and includes the enumerated code defined in the standard, which is used to represent it.
- COV Increment – the degree (in decimal places) by which a property value can vary before a Change of Value is reported to BACnet clients subscribed to COV notifications.
- Access values – **RO** is Read Only, **RW** is Read/Write.

| Index | BACnet Name | Description | BACnet Units | COV Increment (default) | Access |
|---|---|---|---|---|---|
| 0 | Runtime | How long the UPS can support its present load while running on battery power. | seconds (73) | 0 | RO |
| 1 | BatteryTemperature | Temperature as reported by the sensor in the battery compartment, in Degrees C. | degrees-Celsius (62) | 0 | RO |
| 2 | UtilityInputVoltage1 | The AC voltage (VAC) being received by the UPS. | volts (5) | 0 | RO |
| 3 | UtilityInputVoltage2 | The AC voltage (VAC) being received by the UPS. | volts (5) | 0 | RO |
| 4 | UtilityInputVoltage3 | The AC voltage (VAC) being received by the UPS. | volts (5) | 0 | RO |
| 5 | UtilityInputVoltage12 | The AC voltage (VAC) phase to phase being received by the UPS. | volts (5) | 0 | RO |
| 6 | UtilityInputVoltage23 | The AC voltage (VAC) phase to phase being received by the UPS. | volts (5) | 0 | RO |
| 7 | UtilityInputVoltage31 | The AC voltage (VAC) phase to phase being received by the UPS. | volts (5) | 0 | RO |
| 8 | UtilityInputCurrent1 | The current, in Amps, being received by the UPS. | amperes (3) | 0 | RO |
| 9 | UtilityInputCurrent2 | The current, in Amps, being received by the UPS. | amperes (3) | 0 | RO |
| 10 | UtilityInputCurrent3 | The current, in Amps, being received by the UPS. | amperes (3) | 0 | RO |
| 11 | UtilityInputFrequency | The frequency in Hertz (Hz) of the voltage being received by the UPS. | hertz (27) | 0 | RO |

| Index | BACnet Name | Description | BACnet Units | COV Increment (default) | Access |
|---|---|---|---|---|---|
| 12 | OutputFrequency | The frequency in Hertz (Hz) of the output voltage. | hertz (27) | 0 | RO |
| 13 | OutputVoltage1 | The AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 14 | OutputVoltage2 | The AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 15 | OutputVoltage3 | The AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 16 | OutputVAPercentagePhase1 | The UPS load as a percentage of available VA. | percent (98) | 0 | RO |
| 17 | OutputVAPercentagePhase2 | The UPS load as a percentage of available VA. | percent (98) | 0 | RO |
| 18 | OutputVAPercentagePhase3 | The UPS load as a percentage of available VA. | percent (98) | 0 | RO |
| 19 | OutputLoadCurrent1 | The current, in Amps, supplied to the load. | amperes (3) | 0 | RO |
| 20 | OutputLoadCurrent2 | The current, in Amps, supplied to the load. | amperes (3) | 0 | RO |
| 21 | OutputLoadCurrent3 | The current, in Amps, supplied to the load. | amperes (3) | 0 | RO |
| 22 | OutputWattsPercentagePhase1 | The UPS load as a percentage of available Watts. | percent (98) | 0 | RO |
| 23 | OutputWattsPercentagePhase2 | The UPS load as a percentage of available Watts. | percent (98) | 0 | RO |
| 24 | OutputWattsPercentagePhase3 | The UPS load as a percentage of available Watts. | percent (98) | 0 | RO |
| 25 | BypassInputFrequency | Measured frequency on the bypass input for separate bypass feed. | hertz (27) | 0 | RO |
| 26 | BypassInputVoltage12 | The AC voltage (VAC) phase to phase used when the UPS is in bypass mode.<br>This option is not available for all UPS devices. | volts (5) | 0 | RO |
| 27 | BypassInputVoltage23 | The AC voltage (VAC) phase to phase used when the UPS is in bypass mode.<br>This option is not available for all UPS devices. | volts (5) | 0 | RO |

| Index | BACnet Name | Description | BACnet Units | COV Increment (default) | Access |
|---|---|---|---|---|---|
| 28 | BypassInputVoltage31 | The AC voltage (VAC) phase to phase used when the UPS is in bypass mode.<br>This option is not available for all UPS devices. | volts (5) | 0 | RO |
| 29 | PositiveBatteryVoltage | Measured battery voltage - positive battery bus. Or the battery voltage if there is no negative bus. | volts (5) | 0 | RO |
| 30 | NegativeBatteryVoltage | Measured battery voltage - negative battery bus. | volts (5) | 0 | RO |
| 31 | BatteryStateOfCharge | The percentage of the UPS battery capacity that is available to support the attached equipment. | percent (98) | 10 | RO |
| 32 | PositiveBatteryCurrent | The current being battery positive | amperes (3) | 0 | RO |
| 33 | NegativeBatteryCurrent | The current being battery negative | amperes (3) | 0 | RO |
| 34 | OutputActivePowerL1 | Measure the active power on the phase 1 | kilowatt (48) | 0 | RO |
| 35 | OutputActivePowerL2 | Measure the active power on the phase 2 | kilowatt (48) | 0 | RO |
| 36 | OutputActivePowerL3 | Measure the active power on the phase 3 | kilowatt (48) | 0 | RO |
| 37 | OutputApparantPowerL1 | Measure the apparent power on the phase 1 | kilovolt-amperes (9) | 0 | RO |
| 38 | OutputApparantPowerL2 | Measure the apparent power on the phase 2 | kilovolt-amperes (9) | 0 | RO |
| 39 | OutputApparantPowerL3 | Measure the apparent power on the phase 3 | kilovolt-amperes (9) | 0 | RO |
| 40 | UPSapparentpowerrating | The rated apparent full power. | kilovolt-amperes (9) | 0 | RO |
| 41 | DCcapacitorMaintenanceCycle | Measure DC capacitor maintainance cycle period | days (70) | 0 | RO |
| 42 | ACcapacitorMaintenanceCycle | Measure AC capacitor maintainance cycle period | days (70) | 0 | RO |
| 43 | AuxPowerSupplyMaintenanceCycle | Measure the Aux PowerSupply Maintenance Cycle period | days (70) | 0 | RO |
| 44 | AirFilterMaintenanceCycle | Measure the Air filter maintenance cycle period | days (70) | 0 | RO |
| 45 | BatteryMaintenanceCycle | Measure the battery maintenance cycle period | days (70) | 0 | RO |
| 46 | WarrantyCycle | Measure the Warranty Cycle timeperiod | days (70) | 0 | RO |

| Index | BACnet Name | Description | BACnet Units | COV Increment (default) | Access |
|---|---|---|---|---|---|
| 47 | DCcapacitorRunningTime | Measure the DC capacitor running time | days (70) | 0 | RO |
| 48 | ACcapacitorRunningTime | Measure the AC capacitor running time | days (70) | 0 | RO |
| 49 | BatteryRunningTime | Measure the Air filter running time period | days (70) | 0 | RO |
| 50 | AmbientTemperature | Measure the Ambient temperature | degrees-Celsius (62) | 0 | RO |
| 51 | BypassInputVoltage1 | The AC voltage (VAC) being received from Bypass Supply | volts (5) | 0 | RO |
| 52 | BypassInputVoltage2 | The AC voltage (VAC) being received from Bypass Supply | volts (5) | 0 | RO |
| 53 | BypassInputVoltage3 | The AC voltage (VAC) being received from Bypass Supply | volts (5) | 0 | RO |
| 54 | OutputVoltage12 | The Phase12 AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 55 | OutputVoltage23 | The Phase23 AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 56 | OutputVoltage31 | The Phase31 AC voltage (VAC) that the UPS is supplying to its load. | volts (5) | 0 | RO |
| 57 | AuxPowerSupplyRunningTime | Measure the Aux PowerSupply running time | months (68) | 0 | RO |
| 58 | AirFilterRunningTime | Measure the Aux PowerSupply running time | months (68) | 0 | RO |
| 59 | WarrantyElapsedTime | Measure Warranty elapsed time | months (68) | 0 | RO |

# Binary Value Objects

Binary value objects provide information on UPS events (alarms) and binary data properties made available via the BACnet protocol:

- Alarm:
  - **Yes** indicates that the binary value property is a UPS event alarm, for which a notification will be sent to the recipients in the notification class defined in the Notification Class Object. UPS events are model-specific, and only events supported by the UPS are accessible via the Building Management System used.
  - **No** indicates a UPS data point property that has a binary value, e.g. a state.
- Access values - **RO** is Read Only, **RW** is Read/Write.

| BACnet Object Instance | BACnet Name | Description | Alarm | Access |
|---|---|---|---|---|
| 0 | LostUPSComm | NMC lost comm with UPS | Yes | RO |
| 1 | Overload | The load exceeds 100% of rated capacity. | Yes | RO |
| 2 | SelfTestInProgress | UPS self-test in progress. | Yes | RO |
| 3 | LowBattery | The battery power is too low to continue to support the load; the UPS will go on bypass or shutdown if input power does not return to normal soon | Yes | RO |
| 4 | OnBattery | On battery. | Yes | RO |
| 5 | InBypassBypassSwitch | In bypass in response to the bypass switch at the UPS | Yes | RO |
| 6 | FanProblem | System level fan fault exists. | Yes | RO |
| 7 | BatteryChargerInoperable | A battery charger is not fully functional. | Yes | RO |
| 8 | BatteryDisconnected | The battery is not installed properly. | Yes | RO |
| 9 | LostUPSCommOnBat | Lost the management interface-to-UPS communication while the UPS was on battery. | Yes | RO |
| 10 | UPSTempCritical | Rectifier over temperature | Yes | RO |
| 11 | OutputShortCircuit | The output has a short-circuit. | Yes | RO |

| BACnet Object Instance | BACnet Name | Description | Alarm | Access |
|---|---|---|---|---|
| 12 | InverterInoperable | Inverter module is inoperable. | Yes | RO |
| 13 | BatteryNearEndOfLife | Battery near end of life. Order replacement battery. | Yes | RO |
| 14 | EPOActive | EPO activated. | Yes | RO |
| 15 | WeakBattery | Weak battery exists. Battery replacement needed. | Yes | RO |
| 16 | PowerSavingMode | High Efficiency Mode is no longer disabled from an input relay | Yes | RO |
| 17 | InverterShutdownOverload | Inverter overload shutdown | Yes | RO |
| 18 | OverloadOnInstallation | Overload On Installation. | Yes | RO |
| 19 | RectifierFailure | PFC Rectifier is InOperable. | Yes | RO |
| 20 | InverterFault | Inverter Module InOperable. | Yes | RO |
| 21 | AuxPowerFault | Auxiliary Power supply Fault. | Yes | RO |
| 22 | InverterOverTemperature | Inverter Temperature Overload Exist | Yes | RO |
| 23 | InverterOverLoad | Inverter Over Load | Yes | RO |
| 24 | UPSOverLoad | UPS Over load | Yes | RO |
| 25 | InverterFailure | Inverter Module is inoperable | Yes | RO |
| 26 | InputFailure | UPS: Mains input is not available due to inoperable condition. | Yes | RO |
| 27 | RectifierFault | PFC rectifier is inoperable. | Yes | RO |
| 28 | LoadNotPowered | The output power is turned off | Yes | RO |
| 29 | BreakerQ2UOBOpen | Breaker Q2 UOB Open | Yes | RO |
| 30 | BypassOverTemperature | Bypass Over Temperature | Yes | RO |
| 31 | OnBattery2 | On battery power in response to an input power problem. | Yes | RO |
| 32 | LoadkVAAlarmViolation | A load (kVA) alarm threshold violation exists. | Yes | RO |

| BACnet Object Instance | BACnet Name | Description | Alarm | Access |
|---|---|---|---|---|
| 33 | ManualBypass | In bypass in response to the bypass switch at the UPS, typically for maintenance. | Yes | RO |
| 34 | MainsFrequencyFailure | Mains input frequency is out of tolerance. | Yes | RO |
| 35 | MainsVoltageFailure | Mains input voltage is out of range. | Yes | RO |
| 36 | BypassVoltageErrorLowVoltage | Bypass voltage error, low voltage | Yes | RO |
| 37 | BypassVoltageErrorHighVoltage | Bypass voltage error, high voltage | Yes | RO |
| 38 | BypassFrequencyFailure | Bypass input frequency is out of tolerance. | Yes | RO |
| 39 | OutputVoltageErrorLowVoltage | Output voltage low | Yes | RO |
| 40 | OutputVoltageErrorHighVoltage | Output voltage high | Yes | RO |
| 41 | OverlaodOnBypassStaticSwitch | Overload on bypass static switch | Yes | RO |
| 42 | AmbientTempratureOutOfRange | Ambient temperature out of range | Yes | RO |
| 43 | BypassInputVoltageErrorLowVoltage | Bypass input voltage is out of tolerance. | Yes | RO |
| 44 | BatteriesAreDischarging | Batteries are discharging | Yes | RO |
| 45 | BateryCondtionIsWeak | Battery capacity is between 50% to 75%. | Yes | RO |
| 46 | BateryCondtionIsPoor | Battery capacity is lower than 50%. | Yes | RO |
| 47 | BatteryVoltErrorVoltageAboveShutdownLevel | Battery voltage error - voltage above shutdown level | Yes | RO |
| 48 | OutputVoltageError | The output voltage is out of tolerance. | Yes | RO |
| 49 | LoadOnUpsIsAboveWarningLevel | Load on UPS is above warning level | Yes | RO |
| 50 | BatteryVoltErrorVoltageBelowShutdownLevel | Battery voltage error - voltage below shutdown level | Yes | RO |
| 51 | BatteryBreakerOpen | Battery breaker open | Yes | RO |
| | | | | |

| BACnet Object Instance | BACnet Name | Description | Alarm | Access |
|---|---|---|---|---|
| 52 | InternalBatterytemperatureExceedsThreshold | The internal battery temperature exceeds the critical threshold. | Yes | RO |
| 53 | OperationModeStaticBypassStandby | The UPS is ready to enter static bypass but awaits permission from the system. UPS output is off. | Yes | RO |
| 54 | OperationModeInverterStandby | The UPS is ready to enter battery operation but awaits permission from the system. UPS output is off. | Yes | RO |
| 55 | TechnicalCheckRequired | Technical check recommended. Contact Schneider Electric. | Yes | RO |
| 56 | WarrantyExpiringSoon | Warranty expiring soon. Contact Schneider Electric. | Yes | RO |
| 57 | BatteriesCheckRequired | The batteries need to be checked as preventive maintenance is recommended. Contact Schneider Electric. | Yes | RO |
| 58 | AirFilterTechnicalCheckRecommended | The air filters need to be checked as preventive maintenance is recommended. | Yes | RO |
| 59 | FansCheckRecommended | The fans need to be checked as preventive maintenance is recommended. Contact Schneider Electric. | Yes | RO |

# Character String Value Objects

Character string value objects provide information on UPS data properties that return character strings via the BACnet protocol:

- Access values - **RO** is Read Only, **RW** is Read/Write.
- Maximum Characters – the maximum number of characters that can be returned for a UPS property.

| BACnet Object Instance | BACnet Name | Description | Access | Maximum Characters |
|---|---|---|---|---|
| 0 | UPSmodel | The UPS model name. | RO | 24 |
| 1 | UPSserialnumber | The UPS serial number. | RO | 16 |
| 2 | UPSFirmwareRevision | The revision number of the UPS firmware. | RO | 16 |
| 3 | UPSModelFullName | UPS product name. | RO | 24 |
| 4 | UPSDateOfManufacture | UPS date of manufacture. | RO | 11 |

# Multi-State Value Objects

Multi-state value objects provide information on UPS data properties that return a list of options via the BACnet protocol:

- Options – all possible values that can be returned for a UPS multi-value property.
- Access values - **RO** is Read Only, **RW** is Read/Write.

| Index | BACnet Name | Description | Options | Access |
|---|---|---|---|---|
| 0 | Lastbatterytransfer | The cause of the last switch to battery operation. Excludes Self-Test. | None, Input Failure, UPS Battery Test | RO |
| 1 | UPSState | UPS status summary. | Unknown, Online, Online green, On battery, Self-test, Low battery, Shutdown, Bypass, Fault | RO |
| 2 | LastBatteryTestResult | Provide the last battery last result. | Pass, Fail | RO |

# Notification Class Object

When UPS event alarms specified in the Binary Value Objects table occur, a notification is sent to the recipients in the notification class defined in the Notification Class Object.

| Index | BACnet Name | Description | Access |
|---|---|---|---|
| 0 | DefaultNotifier | Default Notification Class | RW |

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