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About this Document

This manual is intended for administrators and users of IPVideo HALO Smart Sensor, and is applicable to hardware version 2, firmware base 2.2 and HALO version 1.30 and later. It includes instructions for using and managing the product on your network. Previous experience of networking will be of use when using this product. Some knowledge electrical circuitry and alarm panel connection may be useful in certain types of installations. Later versions of this document will be posted at www.ipvideocorp.com. See also the product’s online help, available through the web-based interface.

Legal Considerations

**WARNING**  
HALO Smart Sensor is NOT a LIFE SAFETY Device. It does NOT replace such LIFE SAFETY Devices as CO monitors or Smoke Detectors.

**ATTENTION**  
HALO Smart Sensor n’est pas un appareil LIFE SAFETY. Il ne remplace PAS les dispositifs LIFE SAFETY tels que les moniteurs de CO ou les détecteurs de fumée.

Environmental and behavioral monitoring can be regulated by laws that vary from country to country. HALO has been designed to prohibit any direct monitoring or recording of video or audio, but you should check the laws in your local region before using this product.

Liability

Every care has been taken in the preparation of this document. Please inform your local IPVideo Corporation office of any inaccuracies or omissions. IPVideo Corporation cannot be held responsible for any technical or typographical errors and reserves the right to make changes to products and manuals without prior notice. IPVideo Corporation makes no warranty of any kind with regard to the material contained within this document including, but not limited to, warranties of merchantability and fitness for a particular purpose. IPVideo Corporation shall not be liable nor responsible for incidental or consequential damages in connection with the furnishing, performance, or use of this material. This product is only to be used for its intended purpose.

Intellectual Property Rights

IPVideo Corporation has intellectual property rights relating to technology embodied in the product described in this document. In particular, and without limitation, these intellectual property rights may include on one or more patents or pending patent applications in the US and other countries. This product contains open source and licensed 3rd party software components:

- Python
- NodeJS
- seeed
- Rasbian Oracle
- Rasbian Wolfram

The complete list of open source and licensed 3rd party software components can be found through the Dashboard web page of HALO by navigating to: About > Legal > View Licenses.
Equipment Modification
This equipment must be installed and used in strict accordance with the instructions given in the user documentation. This equipment contains no user-serviceable components. Unauthorized equipment changes will invalidate all applicable regulatory certifications and approvals.

Trademark Acknowledgements
IPVIDEO CORPORATION and HALO SMART SENSOR are registered trademarks or trademark applications of IPVideo Corporation in various jurisdictions. All other company names and products are trademarks or registered trademarks of their respective companies.
Vista and WWW are registered trademarks of the respective holders. Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates. SD, SDHC and SDXC are trademarks or registered trademarks of SD-3C, LLC in the United States, other countries or both. Also, miniSD, microSD, miniSDHC, microSDHC, microSDXC are all trademarks or registered trademarks of SD-3C, LLC in the United States, other countries or both.

Regulatory Information:
Electromagnetic Compatibility
This equipment has been designed and tested to fulfill applicable standards for:
• Radio frequency emission when installed according to the instructions and used in its intended environment.
• Immunity to electrical and electromagnetic phenomena when installed according to the instructions and used in its intended environment.

USA
This equipment has been tested using a shielded network cable (STP) and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate the radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the
• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.
The product shall be properly connected using a shielded network cable (STP) and found to comply with the limits for a Class B device.
Safety Information
The following convention is used within this manual. French translations of the critical levels are included.

Hazard Levels

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

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

**CAUTION**
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTICE**
Indicates a situation which, if not avoided, could result in damage to property.

**DANGER**
Indique une situation dangereuse qui, si elle n'est pas évitée, entraînera la mort ou des blessures graves.

**ATTENTION**
Indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner la mort ou des blessures graves.

**MISE EN GARDE**
Indique une situation dangereuse qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures ou modérées.

**REMARQUER**
Indique une situation qui, si elle n'est pas évitée, pourrait entraîner des dommages matériels.

Other Message Levels

**IMPORTANT**
Indicates significant information which is essential for the product to function correctly.

**NOTE**
Indicates useful information which helps in getting the most out of the product.

Electrical Safety
This product complies with IEC/EN/UL 60950-1, Safety of Information Technology Equipment. The product shall be grounded either through a shielded network cable (STP) or other appropriate method. The power supply used with this product shall fulfill the requirements for Safety Extra Low Voltage (SELV) and Limited Power Source (LPS) according to IEC/EN/UL 62368-1 or IEC/EN/UL 60950-1.
Laser Safety Notice

HALO Smart Sensor contains a **CLASS 1 LASER PRODUCT** in accordance with standard IEC60825-1:2014. This product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

**Caution** – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

No regular maintenance is required to keep this product in compliance.

**Level 1 Maintenance Considerations**

Level 1 Maintenance procedures for the HALO Smart Sensor do not require removal of any components that would expose the Class 1 Laser Assembly.
Battery
The product uses a lithium battery as the power supply for its internal real-time clock (RTC). Under normal conditions this battery will last for a minimum of five years. Low battery power affects the operation of the RTC, causing it to reset at every power-up. The battery should not be replaced unless required, but if the battery does need replacing, contact IPVideo Corporation support for assistance.
Lithium coin cell 3.0 V batteries contain 1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME), CAS no. 110-71-4.

WARNING
• Risk of explosion if the battery is incorrectly replaced.
• Replace only with an identical battery or a battery which is recommended by Axis.
• Dispose of used batteries according to local regulations or the battery manufacturer's instructions.

ATTENTION
• Risque d'explosion si la batterie est remplacée de manière incorrecte.
• Remplacez uniquement avec une batterie identique ou une batterie recommandée par IPVideo Corporation.
• Éliminez les piles usagées conformément aux réglementations locales ou aux instructions du fabricant.

Disposal and Recycling
When this product has reached the end of its useful life, dispose of it according to local laws and regulations. For information about your nearest designated collection point, contact your local authority responsible for waste disposal. In accordance with local legislation, penalties may be applicable for incorrect disposal of this waste.

Support
Should you require any technical assistance, please contact your IPVideo Corporation Authorized Reseller. If your questions cannot be answered immediately, your reseller will forward your queries through the appropriate channels to ensure a rapid response. If you are connected to the Internet, you can download user documentation and software updates.

Technical Support via Telephone: (631) 647-9970

Live technical support is available Monday through Friday (excluding holidays) between the hours of 8 AM and 5 PM Eastern Standard Time.

Technical Support via Email: techsupport@ipvideocorp.com
Hardware Overview

1. Network Connection (RJ-45) – requires 802.3af Power over Ethernet
2. Relay Connection (Plug supplied)
3. USB Ports – currently unused
4. Locking Wing – see installation guide
5. Cover Securing Screws (3) – T10 Torx driver required
6. Multi-color LED Indicator
7. Light Sensor

**NOTICE**
The product shall be connected using a shielded network cable (STP). All cables connecting the product to the network shall be intended for their specific use. Make sure that the network devices are installed in accordance with the manufacturer’s instructions. For information about regulatory requirements, see Electromagnetic Compatibility (EMC) on page 3.

**REMARQUER**
Le produit doit être connecté à l'aide d'un câble réseau blindé (STP). Tous les câbles reliant le produit au réseau doivent être destinés à leur utilisation spécifique. Assurez-vous que les périphériques réseau sont installés conformément aux instructions du fabricant. Pour plus d'informations sur les exigences réglementaires, voir Compatibilité électromagnétique (CEM) à la page 3.

**Outer Cover Removed**
The outer cover must be removed (by removing the three T10 TORX screws [5] with the provided wrench) during installation and to perform a manual factory reset. The figure below shows details exposed when the Outer Cover is removed.
Outer Cover Removed

The outer cover must be removed (by removing the three T10 TORX screws [5] with the provided wrench) during installation and to perform a manual factory reset. The figure below shows details exposed when the Outer Cover is removed.

7. Light Sensor on PC board
8. Microphones
9. Loudspeaker
10. Particle air intake port
11. Particle air exhaust port
12. Temperature and Humidity sensor
13. Clamping screws
14. Inner cover mounting screws (3)
15. Gas Sensors
16. Reset button on PC board
17. Inner Cover
Introduction
HALO Smart Sensor is an IoT device that detects environmental changes that occur in many locations including privacy concern areas where surveillance cameras can’t be installed. HALO Smart Sensor is capable of detecting many things such as vaping, smoke, vaping with THC, specific keywords, gunshots, and aggression in areas a camera cannot be placed. Additional sensors give HALO the ability to monitor air quality index (AQI), temperature, humidity, many hazardous chemicals and more. When the sensor values exceed threshold levels, HALO Smart Sensor can send alerts to responders.

Setup Prerequisites
1. One or more HALO Smart Sensor devices connected to a standard office network where the steps in the HALO Installation Procedure have been followed resulting in confirmation that the device is operating and physically connected to the network.
2. The network must be (at least temporarily) provided with a DHCP Server to provide initial IP Addresses.
3. If static addressing is planned, then the correct subnet mask, gateway address, and DNS address must be known.
4. An accessible Windows 10 PC connected to the same network with the Chrome web browser installed and must have the HALO Device Manager (HDM) installed, available at:

   https://ipvideocorp.com/halo-downloads/

Finding HALO Smart Sensors on a Network
Start HALO Device Manager (HDM) on the PC by double clicking the program icon. Please refer to the HDM Guide for connection instructions, available at:

   https://ipvideocorp.com/halo-downloads/

There should be an IP address for each HALO device on the network (for example, 192.168.1.X ).
Connection to a HALO Smart Sensor

Navigate to the desired HALO by either selecting the HALO in HDM and Open Web Page from the Actions drop down menu (Chrome must be default browser) or navigating directly to the IP address in the Chrome web browser. The default Username is “admin” and the default password is “changeme”. HALO contains a security feature that requires a user to generate a new means of authentication before access is granted to the device for the first time.

*If the HALO that is updated from a version prior to 2.2 and has the default password it will change the existing password to “changeme” and require a password change on first login.

HALO restricts access to the built-in web server by usernames and passwords at two different levels, “admin” and “viewer”.

Username Requirements for Admins:
- 5+ Characters
- No Spaces or Special Characters

Password Requirements for Admins:
- 8+ Characters
- 1+ Lowercase Letter
- 1+ Uppercase Letter
- 1+ Numeric Character
- 1+ Special Character (@#$%^&*_ - are allowed)
- Cannot Contain Username

An END USER LICENSE AGREEMENT (EULA) has been provided at first login to every HALO to ensure proper utilization of the HALO software and present important terms, restrictions on use, limits on liability of IPVideo to the end-user, and other useful clauses. At logon the user will be required to add the end username, email address, organization and title to acknowledge.

Dashboard

From this dashboard you can navigate to various display and configuration pages including:

- Graph
- Sensors
- Device
- Network
- Users
- Events
- Actions
- Notifications
- Messaging
- Image
- About
Live View

The dashboard has three different views that can be displayed. These views include Dashboard, Graph, and Sensors.

**Dashboard**
Live information presented including “Normal” and “Alert” state display through color changing indicator icons as well as live readings of specific signatures. This can be configured from the "Image" button.

**Graph**
HALO’s graph display showing live readings of sensors and signatures, graph readings are color coded for signature state. This can be configured from the "Image" button.

**Sensors**
The raw sensors displayed in numerical values, including AQI (Air Quality Index).
Image Settings

Navigate to the image page, from here the Live View page can be altered. Some of the alterations available include:

- Choose Stream Resolution
- Color Options
- Show / Hide Info
- Stream Paths (3rd Party Streams)
- Signatures
  - Show / Hide
  - Graph Scale
  - Color
  - Order

Stream Resolution
Select from the drop down to change the displayed resolution of the Live View stream.

Color Options
Colors for both background and text can be selected.

Show / Hide Info
Information can be added or removed from the Live View stream including Date, Time, UTC Time, and a choice of showing temperature in Celsius.

Saving Setting Changes
All setting changes performed in this section are committed by clicking the "Save Changes" button. Settings can be restored to their default values by clicking the "Defaults" button.
RTSP
RTSP (Real Time Streaming Protocol) can be used to stream the Live View to an RTSP supported platform.

- Click the button for “RTSP Stream Enabled” to turn on this feature.
- Select from the “Image” drop down menu either “Graph” or “Dashboard”. This will select the stream that will be sent over RTSP.
- Select a port number that is not already in use, default is “8554”.
- If authentication is desired, choose a “User” and “Password”.

Saving Setting Changes
All setting changes performed in this section are committed by clicking the “Save Changes” button. Settings can be restored to their default values by clicking the "Defaults" button.
Paths
The defined paths will create a new tab in the web browser that will include the indicated stream or frame. These file paths can be used for streaming to other locations or devices. They include the links below:

- Dashboard MJPEG Stream
- Graph MJPEG Stream
- Stand-Alone Dashboard SVG Stream
- Stand-Alone Graph SVG Stream
- Dashboard Frame (.Jpg)
- Graph Frame (.Jpg)
- Dashboard Frame (.Svg)
- Graph Frame (.Svg)

Live View Graph Display
Signatures can be shown or hidden by selecting the checkbox in the "Show" column. Graph "Min" and "Max" determine the scale for the graph to represent the values of the event signature. This range must include the threshold value of the individual signature. Color of the individual signature graph can be selected, and the signatures can be sorted using the "Order" column sending the selected signature up or down from its current position.

Saving Setting Changes
All setting changes performed in this section are committed by clicking the "Save Changes" button. Settings can be restored to their default values by clicking the "Defaults" button.
About

Navigate to the About page, from here the selection options are “Device Info” and “Legal.”

Device Info Includes:

- Firmware Version
- Device MAC
- Ethernet MAC
- IPV4 & IPV6 IP Addresses
- If WiFi is enabled:
  - IP of Wifi Adapter
  - MAC of WiFi Adapter

Legal

Selecting the “Legal” link will open a pop-up. This pop-up includes a link to “View Licenses” opening a new page to view all third-party licenses.
Device

The “Device” page provides access and adjustment to Date and Time, Device Name, Presets, Reset Config, Reboot Device, Firmware Upload, Config Upload and Download, Temperature Offset, Cloud Connection, and Log Download.

Device Name

The Device Name is going to appear in every notification and is used to identify the location of the HALO. Choosing a name that makes this identification easy is important. Ex.: High School Boys West Bathroom

Preset

Preset includes the current default events and live view. Load after a firmware update for current signatures updates.*

Reset Config

Resets the HALO back to the current firmware default settings.

Reboot Device

Reboots the HALO Device

Firmware

Prior to updating firmware, it is best practice to document any changes made to thresholds and advanced conditions.* These changes can be re-programmed into HALO once the update is complete. Choose the current firmware file and select “Upload Firmware,” this firmware can be downloaded from: https://ipvideocorp.com/halo-downloads/

**DO NOT REMOVE POWER WHILE HALO IS REBOOTING**

After upgrade, click the dropdown menu next to the “Load Preset” button and select “Standard_Events_And_Live_View” then click the “Load Preset” button. Firmware can be updated to multiple HALOs at once using the HALO Device Manager, see separate HDM guide.

*Loading a preset will erase any custom Live View, Events and Actions made prior.
Date and Time

Setting the date and time can be done by manually setting it or using an NTP server. If that server is online the HALO must have internet access. Once settings are input, select the “Save & Reboot” button to commit the settings and reboot the HALO.

Server Config

The "Download Server Config" button will download all HALO settings except User, Time Zone, and IP information to a file. This file can be used as a backup or template for other HALO’s. The "Upload Config" button will load selected settings from a file that was previously downloaded from a HALO. Choosing from the settings dropdown will identify what is loaded into the HALO from that file.

Heat Sensor

Used to offset temperature displayed, measured in Celsius. Positive or negative numbers can be used. Commit the value by selecting “Set Offset.”

Data Logs

Data Logs come in the form of a .csv file and include every raw sensor and every signature. Data logs with the “evt” prefix will record a data point every second and include the HALO data converted to an easy to read format. These files each include 24 hours of data composed of over 1 million data points. The log files without the “evt” prefix are made of raw data, their recording interval is every 15 seconds by default. These are typically going to be used for diagnostic review as they are not as easily interpreted. Logs are stored for 3 days. The files are stored in the volatile memory and are deleted on power loss or power cycle. Files are named for the Year, Month, Date (evtYYYYMMDD.csv)

Signatures contain a "Set" column next to the core data point indicating if the threshold was met for that event. "0" = No
"1" = Yes
Network

The “Network” page provides access and adjustment to Ethernet, WiFi, HTTP / HTTPS, BACnet, and Cloud settings.

Ethernet

If the facility network requires the use of Static IP Addresses, obtain the IP address, Sub-net Mask, Gateway, and DNS to be used for this specific Device, and follow these steps.

Set the Automatic (DHCP) to Off to enable use of a Static Address.

Enter the desired IP Address, Netmask (Sub-net Mask), & Router (Gateway) in the format shown.

Enter the DNS Server IP Address or Domain in the format shown.

Click "Save & Reboot" to commit these settings.

WiFi

WiFi is turned off by default and can be enabled, this can be set up as Automatic (DHCP) or Static. SSID must be typed in exactly and is case sensitive, as is the password.

Click "Save & Reboot" to commit these settings.

If successful connection to a WiFi network is completed, the “About” Page will show an assigned IP address for WiFi.
HTTP / HTTPS

HTTP / HTTPS settings specify the communication port for the devices webpages and the Authentication protocol used to secure the connection. All browser connections and API calls will have to adhere to these definitions. HTTP Port 80 is defined by default and HTTPS Port 443 is defined by default; however, these settings can be edited to define the preferred Port.

The options for Authentication are:
- None (Unsafe)
- Basic
- Digest
- Basic and Digest

Digest Authentication communicates credentials in an encrypted form by applying a hash function to the Username, the Password, a server “supplied once” value, the HTTP method, and the requested URI. Basic Authentication should generally only be used where transport layer security is provided such as HTTPS. Click the “Save & Reboot” button to retain any settings changes.

Selecting the HTTPS or HTTP+HTTPS Type reveals the Create Certificate and Install Certificate buttons.

Create Certificate

Create Certificate will create a self-signed certificate.

Install Certificate

Install Certificate allows user to upload a certificate and key PEM file pair.
BACnet is a data communication protocol for building automation and control networks. To enable BACnet, toggle BACnet Enabled to open the configuration menu. Forms will appear to allow entry of the Device Name and Instance number you wish to see on the network. These values must be unique and cannot be left blank.

To view HALO’s default BACnet “Point Instance Numbers” or add custom “Points” click “Event Instance Numbers.”

This list shows how HALO’s default events are mapped to BACnet “Points.”

A dropdown will appear with your default event “Points” starting at 1 and increasing sequentially. Instance numbers added after the default instances will begin at 128 and increase sequentially from there. After making changes, press the “Save Instance Numbers” button to confirm. Then the “Save” button to confirm the BACnet configuration.

After clicking “Save” on the BACnet tab, you will be able to discover the HALO on your existing BACnet network. Custom events and changes in the BACnet tab will require a rediscovery of the device in the BACnet network.

Shown to the left is an example of a HALO Discovery on a JACE BACnet Controller.
BACnet Protocol Implementation Conformance (PIC) Statement

ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)
(This annex is part of this Standard and is required for its use.)

BACnet Protocol Implementation Conformance Statement

Date: June 18, 2020
Vendor Name: IPVideo Corp
Product Name: Halo IOT Smart Sensor
Product Model Number: 2
Application Software Version: 2.7.13
Firmware Revision: 2.2.0
BACnet Protocol Revision: 14

Product Description:
HALO Smart Sensor is an IoT device that detects environmental changes that occur in privacy concern areas where surveillance cameras can’t be installed. HALO Smart Sensor is capable of detecting vape, smoke, THC and shouting in areas a camera cannot be placed. Additional sensors give HALO the ability to monitor air quality for temperature, humidity, hazardous chemicals and more. When the sensor values exceed normal levels, HALO Smart Sensor can send alerts to security personnel.

BACnet Standardized Device Profile (Annex L):

- BACnet Operator Workstation (B-OWS)
- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Operator Display (B-OD)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):

- DS-RP-B Data Sharing – Read Property B
- DS-RPM-B Data Sharing – Read Property Multiple-B
- DM-DDB-B Device Management – Dynamic Device Binding B
- DM-DOB-B Device Management – Dynamic Object Binding B
- DM-DCC-B Device Management – Device Communication Control B
Segmentation Capability:

- [ ] Able to transmit segmented messages  Window Size ________
- [x] Able to receive segmented messages  Window Size __1024__

Standard Object Types Supported:

<table>
<thead>
<tr>
<th>Object Type Supported</th>
<th>Can Be Created Dynamically</th>
<th>Can be Deleted Dynamically</th>
</tr>
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<tr>
<td>Analog Input</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Binary Value</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Multi State Value</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Data Link Layer Options:

- BACnet IP, (Annex J)
- [ ] BACnet IP, (Annex J), Foreign Device
- [ ] ISO 8802-3, Ethernet (Clause 7)
- [ ] ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- [ ] ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) ____________
- [ ] MS/TP master (Clause 9), baud rate(s): ________________
- [ ] MS/TP slave (Clause 9), baud rate(s): ________________
- [ ] Point-To-Point, EIA 232 (Clause 10), baud rate(s): ________
- [ ] Point-To-Point, modem, (Clause 10), baud rate(s): ________
- [ ] LonTalk, (Clause 11), medium: __________
- BACnet/ZigBee (ANNEX O)
- [ ] Other: ______________________

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)  [ ] Yes  [ ] No

Networking Options:

- [ ] Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- [ ] Annex H, BACnet Tunneling Router over IP
- [ ] BACnet/IP Broadcast Management Device (BBMD)
  - Does the BBMD support registrations by Foreign Devices?  [ ] Yes  [ ] No
  - Does the BBMD support network address translation?  [ ] Yes  [ ] No

Network Security Options:

- Non-secure Device - is capable of operating without BACnet Network Security
- Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
  - [ ] Multiple Application-Specific Keys:
  - [ ] Supports encryption (NS-ED BIBB)
  - [ ] Key Server (NS-KS BIBB)
Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
- ISO 10646 (UTF-8)
- IBM™/Microsoft™ DBCS
- ISO 8859-1
- ISO 10646 (UCS-2)
- ISO 10646 (UCS-4)
- JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports: N/A

BACnet/IP Object Mapping

<table>
<thead>
<tr>
<th>Name</th>
<th>Object Type</th>
<th>Instance ID</th>
<th>Units</th>
<th>Raw Sensor Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (F)</td>
<td>AnalogInput</td>
<td>1</td>
<td>Degrees Fahrenheit</td>
<td>-40 – 185 °F</td>
</tr>
<tr>
<td>Temperature (C)</td>
<td>AnalogInput</td>
<td>17</td>
<td>Degrees Celsius</td>
<td>-40 – 85 °C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>AnalogInput</td>
<td>2</td>
<td>% Relative Humidity</td>
<td>10 – 100% rh (between 0 and 60 °C)</td>
</tr>
<tr>
<td>Visible Light</td>
<td>AnalogInput</td>
<td>3</td>
<td>Luxes</td>
<td>0 – 30,000 Lux</td>
</tr>
<tr>
<td>TVOC</td>
<td>AnalogInput</td>
<td>4</td>
<td>ppb</td>
<td>0 – 60,000 ppb</td>
</tr>
<tr>
<td>CO2 eq</td>
<td>AnalogInput</td>
<td>5</td>
<td>ppm</td>
<td>400 – 60000 ppm (eq)</td>
</tr>
<tr>
<td>Sm Particulates (1um)</td>
<td>AnalogInput</td>
<td>6</td>
<td>µg/m³</td>
<td>0 – 500 µg/m³</td>
</tr>
<tr>
<td>Md Particulates (2.5um)</td>
<td>AnalogInput</td>
<td>7</td>
<td>µg/m³</td>
<td>0 – 500 µg/m³</td>
</tr>
<tr>
<td>Lg Particulates (10um)</td>
<td>AnalogInput</td>
<td>8</td>
<td>µg/m³</td>
<td>0 – 500 µg/m³</td>
</tr>
<tr>
<td>Ammonia</td>
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<td>9</td>
<td>ppm</td>
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<tr>
<td>NO2</td>
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<tr>
<td>CO</td>
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<td>11</td>
<td>ppm</td>
<td>0.1 – 500 ppm</td>
</tr>
<tr>
<td>Noise Level</td>
<td>AnalogInput</td>
<td>12</td>
<td>dB</td>
<td>20 – 130dB SPL</td>
</tr>
<tr>
<td>High Gain Mic</td>
<td>AnalogInput</td>
<td>13</td>
<td>dB</td>
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<tr>
<td>Low Gain Mic</td>
<td>AnalogInput</td>
<td>14</td>
<td>dB</td>
<td>50 – 130dB SPL</td>
</tr>
<tr>
<td>AQI</td>
<td>AnalogInput</td>
<td>15</td>
<td>No Units</td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>AnalogInput</td>
<td>16</td>
<td>Inches of Mercury</td>
<td>9 – 33 inHg</td>
</tr>
</tbody>
</table>

Preset BV Points

| Name            | Object Type | Instance ID | | Name            | Object Type | Instance ID |
|-----------------|-------------|-------------|------------------|-----------------|-------------|
| event_Gunshot   | BinaryValue | 1           | | event_TVOC      | BinaryValue | 8           |
| event_Help      | BinaryValue | 2           | | event_CO2eq     | BinaryValue | 9           |
| event_Vape      | BinaryValue | 3           | | event_CO        | BinaryValue | 10          |
| event_THC       | BinaryValue | 4           | | event_Help000   | BinaryValue | 12          |
| event_Masking   | BinaryValue | 5           | | event_Temp_F    | BinaryValue | 13          |
| event_Agression | BinaryValue | 6           | | event_Temp_C    | BinaryValue | 14          |
| event_Tamper    | BinaryValue | 7           | | event_Light     | BinaryValue | 15          |
| event_AQI       | BinaryValue | 11          | | event_PM1       | BinaryValue | 16          |
| event_USER_EVENT_1 | BinaryValue | 1000  | | event_PM2.5     | BinaryValue | 17          |
| event_USER_EVENT_2 | BinaryValue | 1001  | | event_PM10      | BinaryValue | 18          |
| event_NH3       | BinaryValue |             | | event_NO2       | BinaryValue | 19          |
| event_NO2       | BinaryValue |             | | event_Noise     | BinaryValue | 20          |
| event_Pressure  | BinaryValue |             | | event_Humidity  | BinaryValue | 21          |

Additional BV points Associated with Other Presets

Name        | Object Type | Instance ID | Description                                | State Values                  |
-------------|-------------|-------------|--------------------------------------------|-------------------------------|
AQI Source   | MultiStateValue | 1           | Largest value contributing to Air Quality Index | Unavailable, PM2.5, PM10, CO, NO2 |

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Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
- ISO 10646 (UTF-8)
- IBM™/Microsoft™ DBCS
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- ISO 10646 (UCS-2)
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<td>1</td>
<td>Largest Value Contributing to Air Quality Index</td>
<td>Unavailable, PM2.5, PM10, CO, NO2</td>
</tr>
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Users

The “Users” page is where users can be added and removed. The user-name and password assigned here will be required to access the HALO. If the admin user-name and password is forgotten, a factory reset must be done for recovery. Users can be assigned either the role of Admin or Viewer. Selecting the role will indicate the username and password requirements. The default Username is “admin” and the default password is “changeme”. HALO contains a security feature that requires a user to generate a new means of authentication before access is granted to the device for the first time.

Admin:
Full Control, can make any configuration changes.

Viewer:
Can view Dashboard, Graphs, and Sensors only. Cannot make any configuration changes. Snapshots and limited view of the "About" page are also available.

HALO restricts access to the built-in web server by usernames and passwords at two different levels, “admin” and “viewer”.

Username Requirements for Admins:
• 5+ Characters
• No Spaces or Special Characters

Password Requirements for Admins:
• 8+ Characters
• 1+ Lowercase Letter
• 1+ Uppercase Letter
• 1+ Numeric Character
• 1+ Special Character (!@#$%^&*_ are allowed)
• Cannot Contain Username

Administrator Timeout:
Administrators are automatically timed out with no activity after a specified time period set in “User Management.” This field is measured in minutes and is defaulted to “10” minutes. Changing this field to “0” will disable the timeout feature.
Events

The “Events” page is where event signatures are added, remove, and adjusted. Signatures are created from individual or multiple data sources, thresholds, timing, and machine learning algorithms.

From the "Events" page data sources can be added and removed and “Thresholds” can be adjusted. The “Unique ID” must not contain special characters or spaces. Locations with more than one HALO Smart Sensor should use the same “Unique ID’s” for the same event in each HALO. Click "Save Changes" to apply.

The "Advanced" column button is filled in blue if advanced formula conditions exist with that particular signature.

Clicking on the individual "Advanced" buttons will open a box that advanced formulas reside in. These can be edited and allow for filtering and combining values numerically and logically. "Click "Save Changes" to apply.

Adding a new data source is done by completing the "Unique ID", selecting a data source from the drop down, setting a "Threshold" and clicking the "+" button. "Click "Save Changes" to apply.
Actions

The “Actions” page is used to create an action plan for each event. Each event has an individual action plan. Check the box or drop-down to activate each action.
Email Set:
Notification via email (or text) that a signature met the threshold.

Email Reset:
Notification via email (or text) that a signature has receded below the threshold.

Msg Set (TCP / HTTP):
Message to 3rd party system that a signature met the threshold.

Msg Reset (TCP / HTTP):
Message to 3rd party system that a signature has receded below the threshold.

Relay 1 or 2:
Select for the relay to change state when the threshold is met. Options include “ON” for the duration of the threshold being met or a selected time period ranging from 5 – 60 seconds.

LED Color / Pattern / Priority:
Set the color that the multicolor LED on the front of HALO changes to and the behavior of the LED pattern.

Sound:
Select a preloaded .wav sound file or upload a custom .wav file for selection. Speaker volume can also be selected here, this setting applies to all actions.

Speaker volume can be adjusted, and custom sound files can be uploaded or deleted. Sound files must be in .wav file format.
Notifications

The “Notifications” page has all fields necessary to edit email contents and connect to an email account using SMTP.

The Email Contents section dictates what the notification will look like when sent via email and email to text. The Subject and Body fields can be populated with information to be extracted from the HALO upon an event and can also include character for character information. By placing the specified fields in "%" it will select them and place the current value in that position.

The Reset Delay (measured in seconds) will reduce the possibility of getting multiple messages around the same event. The measured values must recede below the established threshold for this time period and then increase above the threshold again for a 2nd alarm.

The Set Delay works in the exact opposite process.

The HALO uses SMTP (simple mail transfer protocol) to send out alarms.
- You can use your own SMTP server.
- If you do not have an internal SMTP server, you can use a free Gmail account. We would recommend creating a separate Gmail account for your HALO units.

Setting Up a Free Gmail Account
- You can setup your own SMTP server by creating a Gmail account.
- Go to www.gmail.com. Click create account. Click Next.
- Fill in all info (first name, last name, email address, password). Click Next.
- Only Birthday and Gender need to be filled. Click Next.
- Scroll down Privacy and Terms and click I agree.
- Note: Free Gmail accounts are limited to 500 emails a day.
- Turn on less secure apps on your account. Click the link and turn on.
- https://myaccount.google.com/lesssecureapps
The HALO uses SMTP (simple mail transfer protocol) to send out alarms.

- You can use your own SMTP server.
- If you do not have an internal SMTP server, you can use a free Gmail account. We would recommend creating a separate Gmail account for your HALO units.
- Detailed setup instructions for your Gmail account are in our HALO Notifications Setup document located on our website. There are specific settings that need to be activated within the account so be sure to follow the guide. Recipients can be comma separated and can be emails or phone numbers:
  - ex: example@gmail.com, example2@gmail.com
  - ex: halo@ipvideocorp.com, 9171231234@txt.att.net

Provider Email-to-SMS Address Formats:

- **AT&T:** number@txt.att.net (SMS)
  number@mms.att.net (MMS)
- **Sprint:** number@messaging.sprintpcs.com (SMS)
  number@pm.sprint.com (MMS)
- **T-Mobile:** number@tmomail.net (SMS and MMS)
- **Verizon:** number@vtext.com (SMS)
  number@vzwpix.com (MMS)

Check "Also Send Test Email(s)" and click "Save & Test Connection." If test passes, you should get email/text, if test failed look at the options below.

- Firewall is blocking the communication between HALO and SMTP server.
- SMTP setting parameters are wrong.
- HALO might not have internet access (external SMTP)
- IMAP is disabled on your Gmail account (external SMTP)
- Gmail is suspicious of login. Simply login into Gmail and confirm that it was you that signed in.
- HALO has bad / wrong dns, router, gateway, ip

**Email Contents**
Administrators can choose to enter their own specific text in the Subject and Body fields and use the built-in placeholders to automatically generate informative messages.

The placeholder strings that can be used are:

- **%NAME%** Device name as specified in Device settings
- **%IP%** IP Address assigned to HALO Smart Sensor unit
- **%EID%** The Event ID as specified on the Event Tab
- **%THR%** The Threshold of the Event that was surpassed (Numerical Value)
- **%VAL%** The Sensor Value
- **%DATE%** Current Date of the Event
- **%TIME%** Local Time of the Event
Messaging

The “Messaging” page is where HALO makes connections to 3rd party products.

HALO has an open API and works with many 3rd party products including Surveillance, Access Control, Cloud, Building Management Systems, LED Lighting, Network Switching and many others.

External Messaging works with the connections to 3rd party products and sends specified information upon an event. Individual product guides are available on the "Partner Integration Guides" section of the website.

HALO Smart Sensor can send ASCII Messages via TCP/IP Socket or HTTP to supported 3rd party platforms, as a method of triggering defined “Events,” and associating HALO Smart Sensor “Events” with other products such as cameras.

Enter a Set String and click the On or Off radio button to enable or disable this notification. The Set String should identically match one that is defined in the 3rd party product. This will send a notification to the 3rd party product that an “Event” has been triggered.

Enter a Reset String and click the On or Off radio button to enable or disable this notification. The Reset String should identically match one that is defined in the 3rd party product. This will send a notification to the 3rd party product that a sensor(s) defined in an Event has been reset.

Enter the IP Address of the 3rd party product in the Address field.

Enter the Port that is set to listen to events on the 3rd party product.

Specify the Protocol used to transmit the event notification by clicking the TCP or HTTP radio buttons.

Repeat Holdoff can be selected, default value is 5 seconds.
Heartbeat works with the connections to 3rd party products and sends specified information on a specified time interval. Individual product guides are available on the "Partner Integration Guides" section of the website.

Enter a **Message** to be sent, using the wildcards as listed below:

- **%NAME%** Device name as specified in Device settings
- **%IP%** IP Address assigned to HALO Smart Sensor unit
- **%MAC%** MAC Address of the HALO Smart Sensor
- **%EVENTS%** List of current event states
- **%DATE%** Date of the Event
- **%TIME%** Local Time of the Event

Enter the **Interval** Seconds. This setting determines the frequency at which the Heartbeat message is sent, default value is 60 seconds.

Enter the IP Address of the Destination (listening) Server in the **Address** field.

Enter the **Port** that is set to listen to events on the Destination (listening) Server.
Relays

HALO Smart Sensor features two relay controllers that can trigger an external system upon an Event. The relay controls are set to Normally Closed “NC” by default. The ports can be switched to Normally Open “NO” by switching jumper pins. The Jumper Pins are located on the board. The top two covers of the HALO Smart Sensor need to be removed to expose the Relay Jumper Pins.

Once exposed, the default state of each relay can be adjusted independently by moving the jumpers from NC to NO.
Factory Reset

HALO Smart Sensor includes a hard-reset button that can revert the settings to the Factory Defaults. Please note that the outer cover of the HALO Smart Sensor must be removed to expose the reset button.

- After device has been on for more than 30 seconds, use a paperclip or micro screwdriver to engage button.
- Press and hold the button until the LED turns violet to remove all users and reboot.
- Press and hold the button until the LED turns green to remove all users, switch to DHCP and reboot.
- Press and hold the button until the LED turns red to remove all users, switch to DHCP, clear all configuration files and reboot.
Maintenance

HALO is an environmental sensor and as such, proper maintenance will keep your HALO operating at peak levels. This guide will give you recommended best practices for your HALO maintenance.

1. Cleaning
   a. Methods of cleaning that are “HALO Safe”
      1. Gentle vacuum without physical contact with the HALO housing.
      2. Apply small amount of water to a towel to make it damp, not soaked, and wipe the cover and sides of the HALO.
         1. Dry and wipe away any residue.
         2. Do not remove the cover.
         3. Do not allow liquid to penetrate into the interior of the HALO housing.
   b. Disable or notify of alarms that will be activated during cleaning via the HALO GUI interface of HALO Device Manager.
   c. Interval for cleaning is based on the environment and amount of sediment collecting on the HALO housing. It is recommended to clean the HALO at least every 90 days.

2. Maintaining Your Thresholds
   a. Environments change over time. Periodic review of your environmental conditions will ensure that your thresholds are set appropriately, and you can receive notifications of events.
      1. Review active events signatures in your HALO.
      2. Use the log to establish average levels of the events and signatures you are using.
      3. Adjust the thresholds of your active signatures and events to appropriate levels.
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