

Complete User Guide

Install, build, bind points, render and deliver your AHU graphic.

Find an answer

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1. First project: start to finish

AHU Builder creates air-handling-unit graphics and editable Niagara PX pages. Build on the standard canvas, attach controls and points, save your project, and export a finished graphic or Niagara package. Blender runs inside the desktop application for high-definition rendering; you do not need a separate Blender installation.

1. Extract the customer ZIP and run the installer in its Installer folder.
2. Launch AHU Builder and activate your purchase key.
3. Choose Smart Build and select the closest AHU configuration.
4. Inspect the equipment order and air connections. Add, move or remove components to match your unit.
5. Rename equipment and points. Enter actual station ORDs or import a point CSV.
6. Choose animation states, speeds and widget styles. Drag labels and bezels into clear positions.
7. Run Validate and review unresolved bindings.
8. Save the editable configuration JSON, then export a PNG or Niagara Package.
9. For Niagara, copy the complete package into station file space and verify images, bindings, values and operator permissions in Workbench.

Save before closing. Projects are not automatically restored at startup. Keep the configuration JSON to continue editing. A PNG, GIF or PX does not replace that project file.

2. Install, update and uninstall

Use Windows 10 or 11 on an x64 computer. Extract the ZIP to a local folder and run `Installer/AHU Builder_1.2.13_x64-setup.exe`. Follow the installer, then launch AHU Builder. The installer contains Blender, artwork, geometry and a WebView2 prerequisite installer.

Allow disk space for the ZIP, extracted installer, installed resources and exports. Larger renders need more time and memory; no untested minimum GPU/RAM configuration is implied here. Internet access is required for activation, license checks and licensed exports. Rendering uses your computer.

Before an update, save the open project and close the application. Install the supplied version, reopen it and Load your configuration. Keep a backup of the original project. Do not remove the local license merely to install an update.

The installer is unsigned. If Windows displays a publisher warning, verify the file source and checksum and follow your organization's software policy. Do not disable endpoint protection. To verify a file, use PowerShell `Get-FileHash -Algorithm SHA256 -LiteralPath 'C:\path\to\file.exe'` and compare the matching SHA256SUMS.txt entry. The checksum alongside the ZIP applies to the ZIP; the file inside lists its contents.

Uninstall through **Windows Settings** → **Apps** → **Installed apps** → **AHU Builder** → **Uninstall**. Keep your project JSON files and exports in a separate project folder.

3. Activation and export credits

1. Enter the purchase key in the format `AHU-XXXX-XXXX-XXXX-XXXX` .
2. Click Activate AHU Builder and wait for the service response.
3. Open the license button or Help → License & Export Credits to inspect your entitlement, credit balance, License ID, Install ID and connection status.

Control	Use
Refresh License	Request current entitlement and credit information.
Copy Install ID	Copy the identifier when asking support about activation, recovery or a replacement computer.
Apply Key	Apply an activation or refill key supplied for your purchase; check the resulting balance.
Purchase / Manage Credits	Open the storefront. Available packs and entitlements depend on the service and purchase.
Remove Local License	Remove activation stored on this installation. This is not a refund, cancellation or guaranteed device transfer. Record the Install ID and obtain recovery guidance before removing it.

Each completed top-level export-Niagara Package, Niagara PX Only, SVG or PNG-uses a credit. Editing, validating, Save and Load do not. Check the actual balance instead of assuming a fixed included allowance. A recently verified license may permit temporary workspace access during a service interruption, but exports require online authorization.

If authorization succeeds but saving fails, check Downloads and the displayed error before retrying. A save failure after authorization may require support review of credit usage; do not repeatedly export to troubleshoot a missing file.

4. Workspace and navigation

- **Left panel:** Smart Build, Duct Systems, Full Diagnostics and library search remain at the top. Scroll the component list below them; the upward arrow returns it to the top.
- **Library:** use thumbnails and names to choose items. Search narrows the list by component words/category. Clear search to restore the list. Drag a component onto the canvas.
- **Canvas:** drag blank space to pan; use the mouse wheel or – / + to zoom. Fit centers the complete assembly.
- **Properties:** select an item, then scroll the right panel for its controls. The side arrow hides/restores that panel.
- **Full Screen:** enter or exit full-screen working space. If unavailable in the host window, maximize the application.
- **Grid:** change the working-grid appearance. Exact connections use ports rather than the visible grid.
- **End-to-End Snap:** enable matching-port snapping during placement and movement. Turn it off for free placement.
- **Status / Bindings indicators:** show component/connection counts and local binding readiness.

Version 1.2.13 has no 3D / Orbit preview control. The standard canvas is the editor; HD export still uses Blender.

5. Smart Build

1. Save the existing project if you need to retain it.
2. Open Smart Build and select the configuration closest to your intended unit.
3. The preset creates equipment, common points, removable roof panels and applicable short air connections.
4. Inspect the intake, return and discharge paths. Add, move or delete components to match the actual AHU.
5. Rename items, assign real ORDs, then Fit, Validate and Save.

Choosing a preset replaces the current layout. Undo can restore it during the current session. Save beforehand for persistent recovery.

Generated labels, states and values are starting values. Presets are graphic starting arrangements, not commissioned control logic or engineering sizing calculations. Confirm the equipment and airflow order against the actual unit and controls documents.

6. Equipment and connections

Drag an item from the library onto the canvas. With End-to-End Snap enabled, move near a compatible port until the snap target appears and release. Click any placed component and drag it again to reposition or reconnect it. Inspect Connections in Properties: visual proximity alone does not establish a connection.

Auto Assemble needs at least two AHU sections. It sorts existing sections by the application's predefined order and joins their end-to-end ports. It does not add missing sections or determine your actual control sequence. Attached items and following ducts are refreshed; inspect the result.

Action	Effect
Duplicate	Copy the selected item. Review its label and ORD to avoid unintended duplicate bindings.
Disconnect	Remove the item's connections and mounting relationship for independent placement.
Auto Mount	Mount a sensor/accessory at the nearest compatible location. Check the resulting host.
Delete	Remove the selection. Undo restores an unintended deletion within the session.
Undo / Redo	Reverse or reapply supported editing actions. Save files provide persistent recovery.
Arrow keys	Nudge the selected item; Shift makes a larger step. Snapping and overlap checks still apply.

Sections have native dimensions and connection anchors; they are not freely stretched meshes. Choose the appropriate component or duct length. If overlap prevents a move, give the item room or connect appropriate ports.

Drag a point bezel or equipment name itself to reposition its annotation. Drag the equipment graphic to move equipment. Label offsets are saved. Mounted components may follow their host; inspect mounting and Connections after a move.

7. Duct systems and roofs

OA means outside air, RA return air, EA exhaust/relief air and SA supply air. DOAS means dedicated outdoor-air system.

1. Build the unit first and open Duct Systems.
2. Choose Compact, Standard or Extended run length.
3. Select whether to include dampers, common BMS sensors and stream labels.
4. Choose whether generated ductwork follows the AHU when it moves.
5. Select an arrangement. For Custom Four-Port, first choose OA entry, RA entry, EA/relief and SA discharge directions.
6. Inspect ports and remove branches not present on the real unit.

Arrangement families include mixed-air/economizer, supply/return/exhaust fan systems, 100% OA/DOAS, energy recovery, vertical intake/discharge, dual return, dual supply and custom four-port arrangements.

- **Enable/Disable Follow:** control whether a premade stream follows its AHU anchor.
- **Ungroup Stream:** keep its pieces but remove the premade group relationship for manual editing.
- **Delete Stream:** delete the selected premade stream.
- **Remove Premade Duct Systems:** remove generated systems. Save first if you need them.

For custom routes, drag duct pieces, elbows, branches, dampers, transitions and end pieces from the library. Connect matching native openings. Move, duplicate, disconnect or delete pieces as needed and inspect bends before rendering.

Duct: Closed/Open switches compatible pieces between exterior and open-sided cutaway appearances. Not every item has both views. A cutaway reveals internal details; it does not command a live damper.

Smart Build roof panels and short connections are editable items. Select and delete unwanted panels, or temporarily hide roofs in Workspace visibility. Hiding is different from deleting. Undo can restore a deleted item during the session.

8. Properties and visibility

Property	Purpose
Purpose / Role	Where offered, choose the intended role and update the component label.
Display Label	Set a recognizable, preferably unique equipment/point name.
Preview Value / Units	Set example sensor text. This is not a live connection or station write.
Damper Position	Set the supported preview position from 0-100%. Live export positioning is separate.
Preview Status	Preview Normal, Alarm / Dirty / Fault, Override or No Comm styling.
Builder animation preview	Start/stop supported animation on the canvas.
Live value bezel	Show/hide the selected sensor's bezel.
Graphic / Mounted	Identify the artwork and current mounting relationship.
Connections	Inspect connection partners and host relationships.
Smart Recommendations	Review context-dependent suggestions before adding equipment.

Workspace visibility offers Point tags / values, Equipment names, Sensor graphics, Controls / accessories and Roof panels. Choices are saved with the project. These are display controls; configure each component's Niagara widget, label and image binding for export. Inspect the output rather than assuming that hiding a workspace layer removes its PX widget.

9. Animation and state mapping

Select supported equipment and use **Niagara N4 / PX** → **Export animation speed**: Low, Medium or High. Looping Run GIFs retain the selected speed. Identical fan types can have different speeds.

The point-binding tools also offer a default speed. Changing the default does not update every existing component; use **Apply speed to all** for existing looping equipment.

Native PX Image Binding	Use
Static image	One image without live state switching.
Boolean Off / Run	A Boolean point selects off/run imagery. Loop-capable equipment uses a Run GIF. Some state-based equipment uses alternate static images.
Numeric frame map (0-100)	A Numeric point selects a position frame, for example a modulating damper. It follows the live value rather than looping at a selected speed.

Use a Boolean point for Off/Run and a Numeric point for position mapping. Running proof, enable command and percentage command are different points; choose the value that represents the intended graphic behavior.

10. Niagara point ORDs

An ORD identifies the station component or property a widget reads or operates. Copy the encoded slot path from Workbench; a display name or browser URL is not an equivalent binding.

1. Select the component and find Niagara N4 / PX → ORD Binding.
2. Paste the point ORD and set Point data type when known.
3. Check the resolved Export ORD and any validation message.
4. Choose a widget and value format for point components.
5. Use Review bindings to inspect the whole layout.

Example	Meaning
<code>station: slot:/Drivers/AHU1/ points/SAT</code>	Point component. Automatic live-label format reads out.value.
<code>station: slot:/Drivers/AHU1/ points/SAT/out</code>	Status-value slot. Automatic format reads value.
<code>station: slot:/Drivers/AHU1/ points/SAT/out/value</code>	Plain value property.
<code>SAT</code> with base <code>station: slot:/Drivers/AHU1/ points</code>	Expands to the absolute SAT point path.
<code>slot:points/SAT</code>	Explicit relative path; requires the correct PX equipment context in the station.

Set **Station base ORD** for short paths in one equipment folder. A path beginning with `/` expands to a station slot path. A copied `|view:` suffix is removed so the binding targets its underlying slot.

Use encoded Workbench slot names. Literal spaces, backslashes, malformed `$xx` escapes, empty paths and unbound placeholders are rejected. Query, file and network ORDs are not supported as point bindings by this editor. Checks do not confirm point existence or access permissions.

All paths here are examples. Replace them with real station paths. Entering an example does not create a point or make a graphic live.

11. Editable Niagara widgets

Setting	Use
Live Bound Label / Command Popup	Display a value with optional commands. Bind the point component; commands depend on station permissions and available actions.
Setpoint Field Editor	Bind a specific writable property copied from Workbench, such as an appropriate fallback property. Verify type, permitted range and write access.
Action Button	Bind the specific action slot. Verify the intended action and permissions before operating it.
Graphic Only	Suppress the live point widget while retaining the graphic configuration.
ORD value format	Automatic, Point component: out.value, Status value: value, or Plain property value.
BFormat	Leave blank for automatic text formatting; customize only for the intended target type.
Degrade	None or Hide if unresolved. Hidden unresolved widgets can conceal a binding problem.
Status Effect	Color + Blink, Color or None.
Niagara popup / commands	Enable supported popup/command access.
Bezel Width / Height	Set supported exported sensor widget dimensions.
Font Size / Text Color / Background / Border	Style supported exported sensor bezels.
Export equipment label	Include the independent label for supported non-point components.

Typical component format: `SAT: %out.value% °F` . For its out slot: `SAT: %value% °F` . For a plain value: `%.%` . Use `%%` for a literal percent sign in custom BFormat. Automatic formatting handles percent unit text. If text is blank, check the ORD target type before changing its format.

Preview values do not write to Niagara. Test setpoint/action controls deliberately in the target station with appropriate permissions and operating conditions.

12. CSV point import

1. Build the layout and add point/equipment components first.
2. Choose Properties → Niagara point bindings → CSV template.
3. Retain the generated IDs and headers; fill in real ORDs. Set a base ORD for short paths.
4. Save as CSV and choose Import points CSV.
5. Review each target and result. Choose components manually for ambiguous/unmatched rows.
6. Leave replacement disabled unless you intend to change existing bindings.
7. Click Apply ... matched points. Problem rows are skipped.
8. Download the import report, review final bindings and Save. Undo restores prior bindings immediately after import.

Column	How to use it
ID	Keep the current-layout ID for exact matching. An invalid ID does not silently fall back to a name.
Equipment	Equipment context to distinguish matching candidates; preserve template values where practical.
Label	Recognizable point name; exact unique names are safest.
Role	Optional matching role; use the template value.
ORD	Required point/property path. Absolute paths are easiest to verify.
DataType	Numeric, Boolean or String. If unknown, leave blank and review afterward.
Widget	BoundLabel, Setpoint, Action or None as applicable.
AnimationSpeed	Low, Medium or High for supported looping equipment.
Units	Desired displayed engineering unit text.

The importer accepts comma-, semicolon- or tab-delimited text and quoted fields. Limits: 5 MB and 5,000 data rows. Include an ORD/Path column and an ID, Label/Point Name or Role column. Duplicate recognized headers are rejected.

Matching prioritizes IDs, then names and recognized aliases/roles. Common SAT/MAT/RAT/OAT and fan-status names may match; ambiguity requires review. Two rows cannot target the same component. Different existing ORDs are protected unless Replace existing bindings is enabled. Import binds existing components; it does not create new equipment.

Illustrative row (use the downloaded ID template for production):

```
Label,ORD,DataType,Widget,AnimationSpeed,Units  
SAT,station:|slot:/Drivers/AHU1/points/SAT,Numeric,BoundLabel,medium,°F
```

13. Save, Load and New

Save downloads a unit-named `_Configuration.json` containing components, connections, positions, Niagara settings and display choices. Keep revision copies in your project folder.

Load restores a configuration and fits it into view. Save current work before loading another file. PNG, PX and files from other applications are not AHU configuration files. Unsupported component types in an older/newer configuration may not load; compare the result before overwriting the original.

New clears the current layout after confirmation when items exist. Undo can restore supported changes within the current session, but saved backups provide recovery after closing. Startup does not automatically resume unsaved work.

14. Validation and diagnostics

Use Validate to review the current arrangement. Review connection warnings, Review bindings and Export Center's Show Unbound list. Invalid nonempty ORDs block PX export; missing ORDs may be exported as draft placeholders after confirmation, but those points will not be live.

Full Diagnostics → Run Full Diagnostics checks components, topology, sprites, presets, roofs/cutaways and export routines. It restores the current configuration afterward; save before running it. A pass checks application behavior, not station communication or engineering suitability.

Before export, inspect labels, mounts, open/closed ducts, roofs, animation modes, ORDs, formats and page dimensions. Address relevant warnings rather than treating a readiness count as proof of station compatibility.

15. Export choices and sizing

Export	Result
Niagara Package	Recommended first station export: ZIP with editable PX pages, images, rendered PNG, animations, bindings CSV, manifest and package instructions. Uses desktop Blender rendering.
Niagara PX Only	PX only; referenced image assets must already exist in the station at the correct paths.
SVG	Graphic for compatible design tools. Equipment includes raster sprite artwork; the SVG container does not make it unlimited-resolution vector geometry.
High-Resolution PNG	Transparent static full-unit Blender render. No live widgets or animation.

Final graphic width · px sets HD width from 320-7680 px. Height remains proportional. The renderer fits and centers the entire assembly; very tall/large layouts may require a smaller width. More pixels and animation frames take longer.

PX Page Name names the page; **Station Asset Folder** names its images directory. Defaults follow the unit type. Choose unique names for different AHUs to avoid station file collisions.

PX Page Size is separate from HD image width. Choose Auto Fit, a preset or Custom Size. Custom PX dimensions support width 320-7680 and height 240-4320 px. Fit and center scales the assembly into a chosen page; Auto Fit derives the page from content. Canvas Background sets PX page color.

1. Save and validate.
2. Open Export and choose names, page size and final graphic width.
3. Select a format and wait for rendering/authorization.
4. Read the completion path. Desktop PNG/package exports try Downloads first; fallback downloading may ask for a location. Other formats use the application's download behavior.
5. Open and inspect the output before using it in a station.

16. Niagara package contents

File / folder	Purpose
<Unit>.px	Original independent equipment graphics and widgets.
<Unit>_Layered.px	Static shell/duct background with separate equipment overlays.
<Unit>.png	Complete static render.
<Unit>_bindings.csv	Binding inventory.
<Unit>_manifest.json	Layout dimensions and component/export metadata.
<Unit>_README_NIAGARA.txt	Instructions specific to the generated export.
<Unit>_Assets/Components/	Original independent component images.
Backgrounds/	Shell_and_Ductwork and Roof_Foreground PNGs aligned to the PX canvas.
Overlays/	Equipment images with structural shells removed where applicable.
Animation subfolders	Run GIFs and other referenced animation assets.

Layer order: shell background → internal equipment → roof foreground → sensors and annotations. Preserve positions and order when editing. The roof foreground prevents equipment appearing through roof panels.

Do not flatten the PX if you need independent live graphics. Keep the entire matching asset tree. Renaming or relocating files requires updating the references. Original and layered pages provide alternative presentations of the same exported build.

17. Install in Niagara

The export targets Niagara 4.8 and later. Actual operation depends on station modules, bindings and permissions; this release has not been verified on your live station.

1. Back up station files that will be replaced. Extract the Niagara package.
2. Connect in Workbench with permission to manage files and PX views.
3. Copy the PX files and complete assets folder into station Files. Preserve the paths referenced by the PX.
`file:^` refers to station file space; adding an extra parent folder can require changing image paths.
4. Create/select the appropriate PX view through your station's normal workflow and point it to the exported PX.
Explicit relative point ORDs require the correct equipment context.
5. Open the page and check every image. For a missing image, compare its file ORD to the actual station path.
6. Verify point ORDs resolve to the intended components/properties. Compare live values and units with Workbench.
7. Check Boolean off/run states, GIF speeds, numeric damper positions and status styling.
8. Inspect editable bezels/labels in the Widget Tree. Test action/setpoint controls only when authorized and safe for the equipment.
9. Save and test as the intended operator, with their permissions and display size.

Local ORD validation does not establish station existence, connectivity, module availability, write permissions or correct controls behavior. Resolve these in Workbench before handover. Update bindings if station component paths later change.

18. Troubleshooting

Symptom	Check / action
Item will not snap	Enable snapping; use compatible native openings and orientation; move closer; inspect Connections.
Move is blocked	Check section overlap. Disconnect if appropriate and create space.
Sensor/duct follows equipment	Inspect mount or stream Follow settings. Disconnect, Disable Follow or Ungroup as needed.
Tag moves instead of unit	Drag the equipment graphic rather than the label.
Missing labels/sensors/roofs	Check Workspace visibility, Live value bezel and per-item export label/widget settings.
Cannot find Properties	Select an item, restore the right panel with its arrow, then scroll. Controls vary by component type.
CSV has no matches	Use a current-layout template; check IDs, unique names, headers and base ORD. Map ambiguous targets manually.
CSV rows skipped	Inspect the report for invalid paths, datatype errors, duplicate targets, ambiguity or protected existing bindings.
ORD rejected	Copy the encoded Workbench slot path. Remove URL syntax, spaces and malformed escapes; set a base for short paths.
Live value blank	Check actual point existence, permissions, degrade behavior and component/out/value formatting.
Fan does not animate	Check Boolean binding mode, live Boolean value, GIF file and widget mapping. PNGs are static.
Damper position wrong	Check Numeric mapping and the actual 0-100 value/scaling in Workbench.
PX images missing	Restore the complete assets folder and exact file:^ paths. PX-only does not contain assets.
Graphic size/crop wrong	Distinguish HD width from PX dimensions. Use Auto Fit or Fit and center; inspect edited widget positions.
HD render fails	Use the desktop application, reduce width, check disk space and record the error. Do not remove bundled rendering resources.
Cannot find export	Read the completion path, check Downloads, fallback dialogs and duplicate filenames.
License/credit problem	Refresh License, check connectivity and key type, record the Install ID, and contact the seller through your purchase/support channel.
Previous build missing	Load the saved configuration JSON. Unsaved work is not restored at startup.

For support provide version 1.2.13, Windows version, exact error, reproduction steps, screenshot and export format. Include the Install ID for licensing issues and a sanitized configuration if requested. Do not send bearer tokens, passwords or private station credentials.

19. Shortcuts and glossary

Input	Action
Drag blank canvas	Pan
Wheel / - / +	Zoom
Fit	Center and fit assembly
Drag component	Move/snap
Drag bezel/name	Move annotation
Delete / Backspace	Delete selection
Ctrl+D	Duplicate
Ctrl+Z	Undo
Ctrl+Y / Ctrl+Shift+Z	Redo
Arrow / Shift+Arrow	Small / larger nudge

Editing shortcuts are suppressed while typing in an input, select or text area. Click the canvas/item first.

Bezel: point-value display. **ORD:** station object/property reference. **PX:** Niagara graphic page. **BFormat:** value-to-text format expression. **CSV:** delimited point list. **VFD:** variable-frequency drive. **SAT/MAT/RAT/OAT:** supply/mixed/return/outside air temperature. **DP:** differential pressure. **Overlay:** separate equipment graphic placed above a background.

20. Final handover checklist

- Editable configuration and backup saved.
- Equipment, ports, mounts and panels match the intended unit.
- Unique labels, point bindings and skipped CSV rows reviewed.
- Animation modes and speeds checked.
- Correct page dimensions, image width and unique asset names selected.
- Rendered PNG and chosen PX presentation visually inspected.
- Station files, live values, permissions and write/action controls verified.
- Customer retains project backup, instructions and applicable finalized legal terms.

The installer contains application/rendering resources; developer source is maintained separately. Third-party license notices and corresponding Blender source are included in the installed application's `THIRD-PARTY` folder. Blender's distributed license and copyright files remain in its `blender` folder.