

# CLAXHAWKIO16

*IO-16 module for HAWK*

## Installation Instructions



## GENERAL

This document covers the mounting and wiring of the CLAXHAWKIO16 module. It assumes that you are an engineer, technician, or service person who is performing control system installation.

The CLAXHAWKIO16 is a compact direct I/O module for auxiliary monitoring and control when used with a HAWK2xx or HAWK6xx series controller. This option expands the HAWK by an additional sixteen logic-controlled points.

Included are eight universal inputs, four form "A" (SPST) relay outputs, and four analog (voltage only) outputs. This greatly expands the HAWK's monitoring and control capabilities with fast, reliable, direct inputs and outputs for monitoring power, temperature, humidity, and status.

The on-board I/O can be used to monitor pulse contacts from power/demand meters, analog sensors, or transducers, as well as to control energy-consuming devices such as fans, lights, or pumps with digital relay outputs. Also included are four analog outputs to proportionally control dampers, valves, and other devices.

Up to four CLAXHAWKIO16 modules may be cascaded to a HAWK 2xx, to provide a total of 32 UIs, 16 relays, and 16 analog output points.

- Preparation,
- Precautions,
- Installation and Start-up Outline
- Board Layout,
- Wiring Details,
- Ndio Board (Software) Representation
- Power Up and Initial Checkout,
- Related Documentation,
- Replacement Parts,
- Replacing an CLAXHAWKIO16
- Certifications and Declaration of Conformity

**NOTE:** The software installation and configuration required for a fully functioning unit is not covered in this document. For more information on these topics refer to the documents listed in the ["Related Documentation"](#) section.

## PREPARATION

Unpack the CLAXHAWKIO16 and inspect the contents of the packages for damaged or missing components. If damaged, notify the appropriate carrier at once and return any damaged components for immediate repair or replacement. See ["Returning a Defective Unit"](#).

## Included in Package

The following items are included in this package:

- One CLAXHAWKIO16 module, with grounding wire having a quick-disconnect 0.187" female connector.
- These CLAXHAWKIO16 Installation Instructions.
- Four (4) 6-position terminal plugs, for I/O wiring.
- Eight (8) 499-ohm resistors for 4-20 mA inputs.

## PRECAUTIONS

This document uses the following warning and caution conventions:

**CAUTION** Cautions remind the reader to be careful. They alert readers to situations where there is a chance that the reader might perform an action that cannot be undone, might receive unexpected results, or might lose data. Cautions contain an explanation of why the action is potentially problematic.

**WARNING** Warnings alert the reader to proceed with extreme care. They alert readers to situations where there is a chance that the reader might do something that can result in personal injury or equipment damage. Warnings contain an explanation of why the action is potentially dangerous.

## Safety Precautions

The following items are warnings of a general nature relating to the installation and start-up of the HAWK 2xx/6xx controller. Be sure to heed these warnings to prevent personal injury or equipment damage.

**WARNING** Depending on power module used, the circuit powering the HAWK 2xx/6xx is 24 Vac at 50/60 Hz or 24 Vdc (if using CLAXNPBPWR) or from 100...240 Vac at 50/60 Hz (if using wall power modules CLAXWPMEU or CLAXWPMUK). Disconnect power before installation or servicing to prevent electrical shock or equipment damage. Make all connections in accordance with national and local electrical codes. Use copper conductors only. To reduce the risk of fire or electrical shock, install in a controlled environment relatively free of contaminants. This device is only intended for use as a monitoring and control device. To prevent data loss or equipment damage, do not use it for any other purpose.

## I/O Module Connection Precautions

**WARNING** Remove power from the unit before plugging or unplugging I/O accessory modules. If the unit switches to battery operation, wait for all LEDs to go out.

Do not connect live voltages to the inputs or outputs of an CLAXHAWKIO16 or CLAXHAWKIO34 while it is in an “un-powered state” before plugging the module into a HAWK2xx/6xx (EN1Z-0944GE51). Otherwise, damage to the I/O module and/or the HAWK controller may result!

Do not plug in more than four (4) CLAXHAWKIO16 modules into a single HAWK2xx/6xx (EN1Z-0944GE51). Doing so will have unexpected effects on the software, and may overload the power supply.

I/O modules are designed to be directly plugged into the HAWK2xx/6xx (EN1Z-0944GE51) or directly attached modules. Do not use a ribbon cable or extend the length of the I/O cable as this will increase radiated signal noise, decreases analog stability, and may introduce communication problems.

## Static Discharge Precautions

Static charges produce voltages high enough to damage electronic components. The microprocessors and associated circuitry within a CLAXHAWKIO16 are sensitive to static discharge. Follow these precautions when installing, servicing, or operating the system:

**CAUTION** Work in a static-free area.

Discharge any static electricity you may have accumulated. Discharge static electricity by touching a known, securely grounded object.

Do not handle the printed circuit board (PCB) without proper protection against static discharge. Use a wrist strap when handling PCBs. The wrist strap clamp must be secured to earth ground.

## Installation and Start-up Outline

**Note** If installing the HAWK2xx/6xx (EN1Z-0944GE51) and CLAXHAWKIO16 at the same time, please refer to the appropriate HAWK installation document, for example the HAWK2xx/6xx (EN1Z-0944GE51) Installation Instructions document. Note that a maximum of four CLAXHAWKIO16 modules are supported.

The major steps to installing and starting the CLAXHAWKIO16, are outlined as follows:

- Step 1** Physically mount the CLAXHAWKIO16 module with the HAWK2xx/6xx (EN1Z-0944GE51). See “Physical Mounting.” Make sure that the CLAXHAWKIO16 input connector is properly seated into the IO connector on the HAWK (or if used, another CLAXHAWKIO16 module). Note the previous “I/O Module Connection Precautions”.
- Step 2** Make wiring connections for earth ground and I/O wiring. See “Wiring Details”.
- Step 3** Apply power and perform an initial checkout. See “Power up and Initial Checkout”.

## Physical Mounting

The following applies to mounting a CLAXHAWKIO16 module with a HAWK2xx/6xx (EN1Z-0944GE51) series controller:

- You can mount the units in any orientation. It is not necessary to remove the covers before mounting.
- Mounting on a 35mm wide DIN rail is recommended. Both the HAWK2xx/6xx (EN1Z-0944GE51) unit base and CLAXHAWKIO16 unit base have a molded DIN rail slot and locking clip, as does the CLAXNPBPWR module. Mounting on a DIN rail ensures accurate alignment of connectors between all modules.
- If DIN rail mounting is impractical, you can use screws in mounting tabs on the HAWK2xx/6xx (EN1Z-0944GE51), then in the CLAXHAWKIO16 module. Mounting tab dimensions are on the last page of this document.

The following procedure provides step-by-step DIN rail mounting instructions for the CLAXHAWKIO16.

**Note** If the HAWK is already in use:

Back up its configuration to your PC using COACH<sup>AX</sup> 3.n.nn. You can do this with a platform connection to the HAWK, using the Backup command in the Platform Administration view.

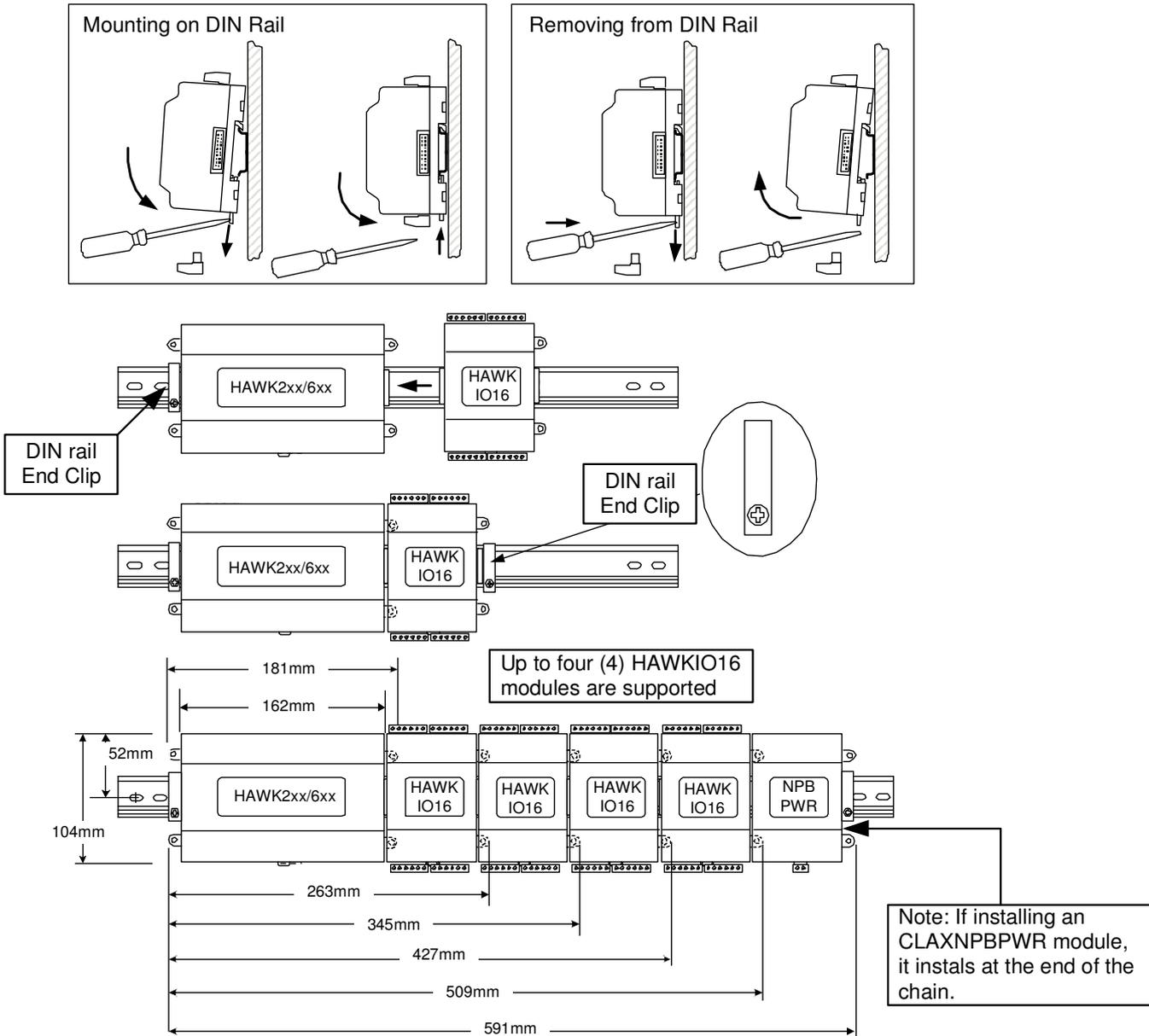
Turn off power to the HAWK and disconnect the power cord. Be sure that all of the LEDs are off.

Make sure that the HAWK is not running off of battery power.

If the HAWK2xx/6xx (EN1Z-0944GE51) is using a CLAXNPBPWR module for power, remove it before mounting CLAXHAWKIO16 modules.

#### **Procedure 1 To mount on DIN rail**

- Step 1** Remove the bottom I/O connector plug(s) that cover the plastic DIN locking clip.
- Step 2** Position the CLAXHAWKIO16 on the rail, tilting to hook DIN rail tabs over one edge of the DIN rail (Figure 1).
- Step 3** Use a screwdriver to pry down the plastic locking clip, and push down and in on the CLAXHAWKIO16, to force the clip to snap over the other edge of the DIN rail.
- Step 4** Slide the CLAXHAWKIO16 on the DIN rail to connect its 20-position plug into the HAWK2xx/6xx (or if used, another CLAXHAWKIO16). If a CLAXNPBPWR module is used, it mounts last. Make sure that all modules are firmly seated.
- Step 5** Continue to mount all CLAXHAWKIO16 modules, and if used, then the CLAXNPBPWR module.
- Step 6** To keep the final assembly together, secure at both ends with DIN rail end-clips provided by the DIN rail vendor. This also prevents the assembly from sliding on the DIN rail. See Figure 1.

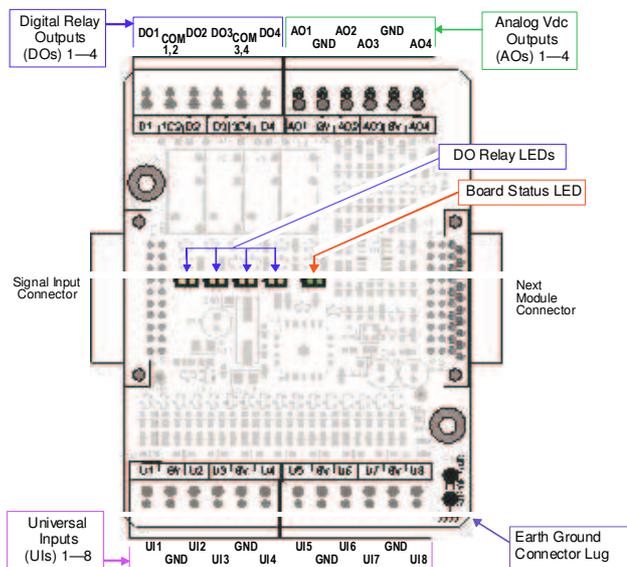


**Fig. 1. CLAXHAWKIO16 module mounting details**

**Note** To remove a CLAXHAWKIO16 module from DIN rail, slide it away from other modules. Insert a screwdriver in the center plastic locking tab and pull downwards, then lift the unit outwards. You may need to first remove an I/O connector plug, as shown at the top of Fig. 1.

## CLAXHAWKIO16 Board Layout and Terminal Locations

The CLAXHAWKIO16 provides 8 universal inputs supporting analog inputs (temperature, resistance, voltage, and current) and digital inputs (contact closure, pulse count), and 8 outputs: 4 relay (24Vac/dc, 0.5A max.) outputs and 4 analog outputs (0–10 Vdc). Wiring terminal positions are shown below (Figure 2), along with LED locations.



**Fig. 2. CLAXHAWKIO16 Wiring Terminal Locations**

## Wiring Details

See Figure 2 above to locate connectors and other components on the CLAXHAWKIO16 controller.

Make connections to the CLAXHAWKIO16 in the following order.

- Step 1 Connect the earth grounding wire (with spade connector) from the earth ground lug on the CLAXHAWKIO16 to a nearby earth grounding point. See “Grounding” for details.
- Step 2 Connect I/O wiring. See sections “Inputs”, and “Outputs”.
- Step 3 Apply power to the unit. See “Power up and Initial Checkout,”

## Grounding

An earth ground spade lug (0.187") is provided on the base of the CLAXHAWKIO16 (as well as the HAWK2xx/6xx (EN1Z-0944GE51), NPBPWR) for connection to earth ground. For maximum protection from electrostatic discharge or other forms of EMI, connect each earth ground using a #16 AWG or larger wire. Keep these wires as short as possible.

See Figure 3 for the location of the earth grounding wire for the CLAXHAWKIO16.

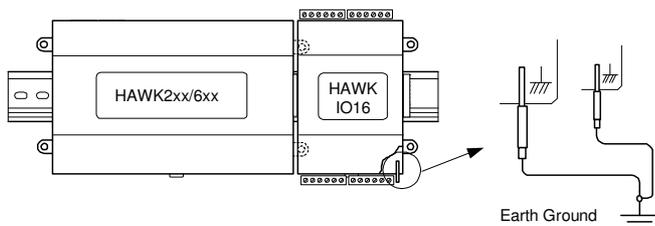


Fig. 3. CLAXHAWKIO16 earth ground connection

Note Do not apply 24V power (reapply power to the NPBPWR or WPMXXX) until all other wiring is completed, including CLAXHAWKIO16 inputs and outputs. See “Power up and Initial Checkout,”.

## Inputs

Each of the 8 universal inputs (UI) can support any one of the following:

- Type-3 10K ohm Thermistor
- Resistive 0—100K ohms
- 0–10 Vdc
- 4–20 mA
- Binary Input

### Thermistor

The inputs support 10K Thermistor temperature sensors using a ThermistorInputPoint. Input accuracy is in the range of  $\pm 1\%$  of span. By default, conversion is for a standard Type 3 thermistor sensor, with a sensor range of  $-23.3^{\circ}$  to  $57.2^{\circ}\text{C}$ . Using a conversion type of “Tabular Thermistor,” you can specify a different thermistor response curve, by importing a thermistor curve .xml file. Currently, the ndio module contains an xml folder with thermistor curves for a Radio Shack sensor model 271-0110 and TE-6300 10K type sensor. You can also edit and export (for reuse) customized thermistor xml files. See the NiagaraAX Ndio Guide for more details.

Figure 4 shows the wiring diagram.

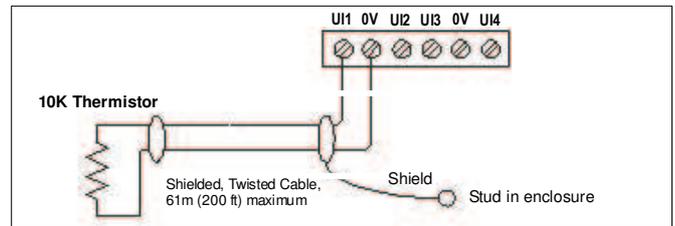


Fig. 4. Thermistor wiring

### Resistive 0—100K ohms

The inputs can read a resistive signal within a range from 0 to 100,000 ohms. Wiring is the same as shown for a Thermistor temperature sensor (Figure 4).

Resistive signals require a **ResistiveInputPoint**.

Note UI inputs are optimized to provide the best resolution around the 10K ohm range. For a sensor with a range far from 10K ohms (such as a 100-ohm or 1000-ohm type), resolution will be poor. To use such a sensor, it is recommended you install a transmitter that produces a Vdc or mA signal, and then wire the transmitter to the UI according to the 0–10 Vdc or 4–20 mA instructions.

### 0–10 Vdc

The inputs support self-powered 0–10 Vdc sensors. Input impedance is greater than 5K ohms.

0–10 volt accuracy is  $\pm 2\%$  of span, without user calibration. Figure 5 shows the wiring diagram.

0–10 Vdc sensors require a **VoltageInputPoint**.

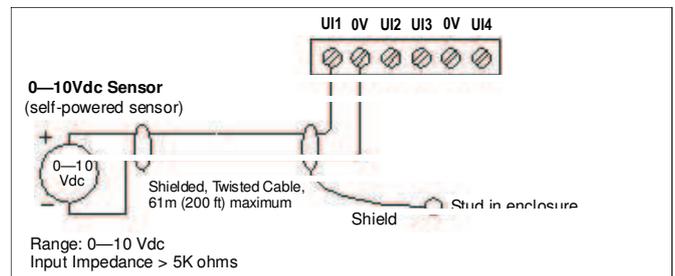


Fig. 5. 0-10 Vdc wiring

### 4–20 mA

The inputs support self-powered 4–20 mA sensors. Input accuracy is  $\pm 2\%$  of span, without user calibration. Figure 6 shows the wiring diagram, which requires a 499 ohm resistor wired across the input terminals.

4–20 mA sensors also require the **VoltageInputPoint**.

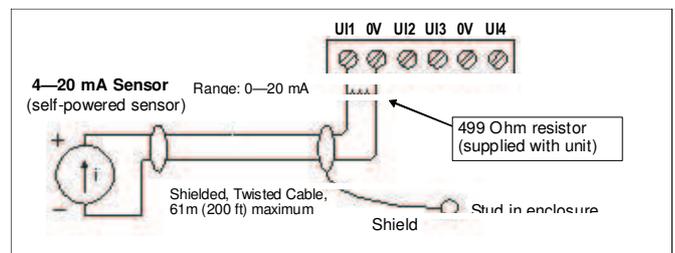


Fig. 6. 4-20 mA wiring

### Binary Input

The universal inputs support both pulse contacts and normal dry (equipment status) contacts.

- Pulse contacts may have a change-of-state (COS) frequency of up to 20 Hz with a 50% duty cycle. Note: Minimum dwell time must be > 25ms. (Contacts must remain open at least 25ms and be closed at least 25ms.)
- Standard dry contacts must have a 1 Hz. (or less) COS frequency, with minimum dwell time > 500ms. (Contacts must remain open at least 500ms and be closed at least 500ms.)

Both types of dry contacts support 3.3 Vdc open circuits or 330 µA short-circuit current.

Figure 7 shows the wiring diagram. For a pulse contact, use the **CounterInputPoint** in the station database.

For other dry contacts, use the **BooleanInputPoint**.

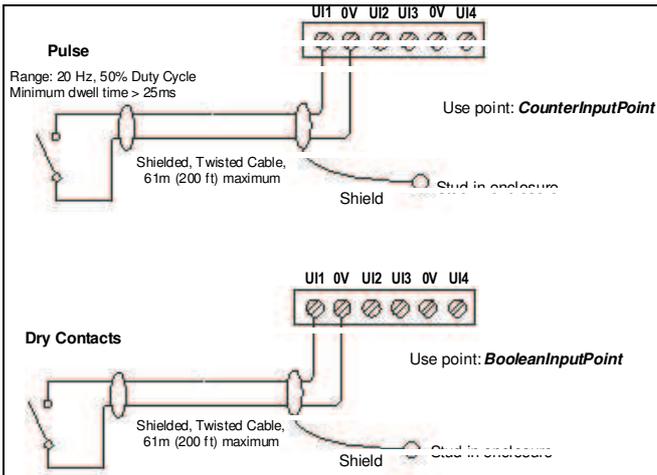


Fig. 7. Binary input wiring

## Outputs

An CLAXHAWKIO16 has four (4) digital relay outputs and four (4) 0–10 volt analog outputs.

### Relay Outputs

Each relay output is rated at 24 Vac or Vdc at 0.5A. Relay outputs have MOV (metal oxide varistor) suppressors to support inductive-type loads such as heavy-duty relay coils.

**Warning** Relays are not rated for AC mains (line level) powered loads (instead, 24V maximum). Never use the HAWK’s power transformer to power I/O loads. Using the HAWK transformer introduces potentially damaging switching transients into the HAWK.

Use a **BooleanOutputWritable** in the station for each output. Figure 8 shows an example wiring diagram.

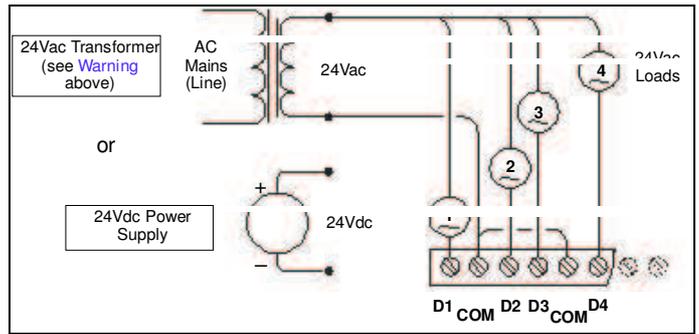


Fig. 8. Relay output wiring diagram

Note that the two common DO terminals are isolated from each other. This is useful if controlled loads are powered from different circuits.

An LED status indicator for each relay (D1—D4) is located on the board (Figure 2), and also visible through the cover. Under normal operation, each digital status LED indicates activity as follows:

- Off—relay open / no current flows.
- On—relay closed / load current flows.

Therefore, an On status indicates that the load is powered.

### Analog Outputs

Analog outputs (AO) are referenced by the terminals labeled An and 0V (ground). Each AO can supply a maximum of 4 mA over the entire 0 to 10Vdc range. The minimum input impedance of a device controlled by an AO must be greater than 2500 ohms. Typical wiring for an AO is shown in Figure 9.

For each AO, use a **VoltageOutputWritable** in the station database.

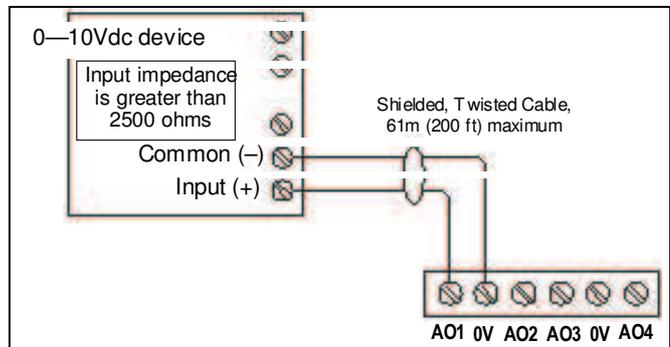
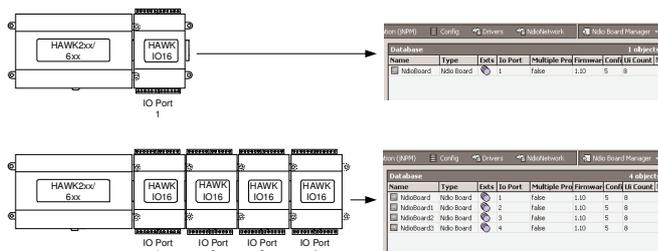


Fig. 9. Analog output wiring diagram

## NdioBoard (Software) Representation

In the Niagara station interface to the HAWK2xx/6xx (EN1Z-0944GE51), each IO module appears as one NdioBoard under the station’s NdioNetwork. If a HAWK has only one CLAXHAWKIO16 module, the NdioNetwork has a single NdioBoard component, where the “Io Port” property of the NdioBoard is 1. See Figure 10, top.

Upon discovery, if the HAWK has multiple CLAXHAWKIO16 modules, the module closest to the HAWK is the first NdioBoard (property Io Port 1), the next module in the chain is NdioBoard1 (property Io Port 2), and the third module is NdioBoard2 (property Io Port 3). See Figure 10, bottom.



**Fig. 10. NdioBoard assignment is determined by proximity order to HAWK**

Once the operating system identifies the NDIO processors, the I/O board status LED on each IO module turns green. The green status LED means that the HAWK is able to communicate with the I/O. It does not indicate anything about the status of the Niagara station or its Ndio components.

**Note** Any time a powered IO module's status LED is not lit, all outputs are in "failsafe" state (all relay outputs OFF, and all AOs are at a 0-volt level). See Figure 2 for location of the CLAXHAWKIO16 status LED.

Each type of input or output used requires a special Niagara Direct Input/Output (Ndio) point to be added in the station database. These components act as the station interface to the physical I/O points. The Ndio points you need for each input or output type are noted in previous wiring sections in boldface.

For Ndio component details, see the Ndio Guide in COACH<sup>AX</sup> online Help, or the same document in PDF.

## Power up and Initial Checkout

- Step 1** Apply power to the HAWK2xx/6xx (EN1Z-0944GE51) (e.g., NPBPWR or WPMXXX). The CLAXHAWKIO16 board status LED will initially be Off (Figure 2). Allow the HAWK sufficient time to boot (at least 2 minutes).
- Step 2** Upgrade the HAWK firmware if necessary (if HAWK has a Niagara build earlier than your COACH<sup>AX</sup>). Using COACH<sup>AX</sup>, open a platform connection to the HAWK. Use the Commissioning Wizard to do this. For more details, see the HAWK NiagaraAX Install and Startup Guide, also available in COACH<sup>AX</sup> online Help. Make sure to install the ndio software module.
- Step 3** Verify that the CLAXHAWKIO16 board status LED is now lit green.
- Step 4** Using COACH<sup>AX</sup>, open the station (if running), or open a platform connection and start the station with using the Application Director.
- Step 5** If not already present, add an NdioNetwork component to the station's Drivers Container, and use "Manager" views and "Learn Mode" to discover and add Ndio components to the station database. See "NdioBoard (Software) Representation," page 11. For more details about Ndio components, refer to the Ndio Guide, also available in COACH<sup>AX</sup> online Help (doc Ndio).
- Step 6** Mount the replacement CLAXHAWKIO16 as it was previously, using the same DIN rail location and/or screws.
- Step 7** Reconnect the earth ground wire to the CLAXHAWKIO16 grounding lug.
- Step 8** Reconnect all I/O connectors to the CLAXHAWKIO16.
- Step 9** If any of your I/O points have voltage, turn the devices back on, or reconnect power to them.
- Step 10** Restore power to the HAWK2xx/6xx (EN1Z-0944GE51), and perform a checkout using NiagaraAX COACH<sup>AX</sup> (see "Power up and Initial Checkout,").
- Step 11** For more details, see the NiagaraAX Ndio Guide and NiagaraAX Install and Startup Guide.

- NiagaraAX Install & Startup Guide
- NiagaraAX Ndio Guide
- NiagaraAX User Guide

## Replacing an CLAXHAWKIO16

**Caution** Before handling circuit boards, discharge any accumulated static by touching the nearby earth grounding point. For details, see the "Static Discharge Precautions" section.

To replace the CLAXHAWKIO16 accessory module in the field, proceed as follows:

### Procedure 2 Replacing an CLAXHAWKIO16 accessory module.

- Step 1** Using the appropriate NiagaraAX software tool, back up the HAWK's configuration to your PC.
- Step 2** Remove power to the HAWK. The unit should power down automatically.

**Note** If any I/O points have voltage, turn the devices off or disconnect power to them.

- Step 3** Note positions of all I/O wiring going to the CLAXHAWKIO16 to be replaced, as well as for any other installed modules. If necessary, label connectors and accessory modules to avoid mis-connection later (after CLAXHAWKIO16 is replaced). The software that runs on the HAWK2xx/6xx (EN1Z-0944GE51) expects the terminal positions to be the same in the replacement CLAXHAWKIO16, in order to collect data from or to control the attached devices.
- Step 4** Unplug all connectors from the CLAXHAWKIO16, including all I/O connectors and earth ground wire.
- Step 5** Remove any screws or DIN rail clips securing the CLAXHAWKIO16, removing it from its mounting. See Figure 1 for details on removal from (and mounting onto) DIN rail.
- Step 6** Mount the replacement CLAXHAWKIO16 as it was previously, using the same DIN rail location and/or screws.
- Step 7** Reconnect the earth ground wire to the CLAXHAWKIO16 grounding lug.
- Step 8** Reconnect all I/O connectors to the CLAXHAWKIO16.
- Step 9** If any of your I/O points have voltage, turn the devices back on, or reconnect power to them.
- Step 10** Restore power to the HAWK2xx/6xx (EN1Z-0944GE51), and perform a checkout using NiagaraAX COACH<sup>AX</sup> (see "Power up and Initial Checkout,").
- Step 11** For more details, see the NiagaraAX Ndio Guide and NiagaraAX Install and Startup Guide.

## Certifications and Declaration of Conformity

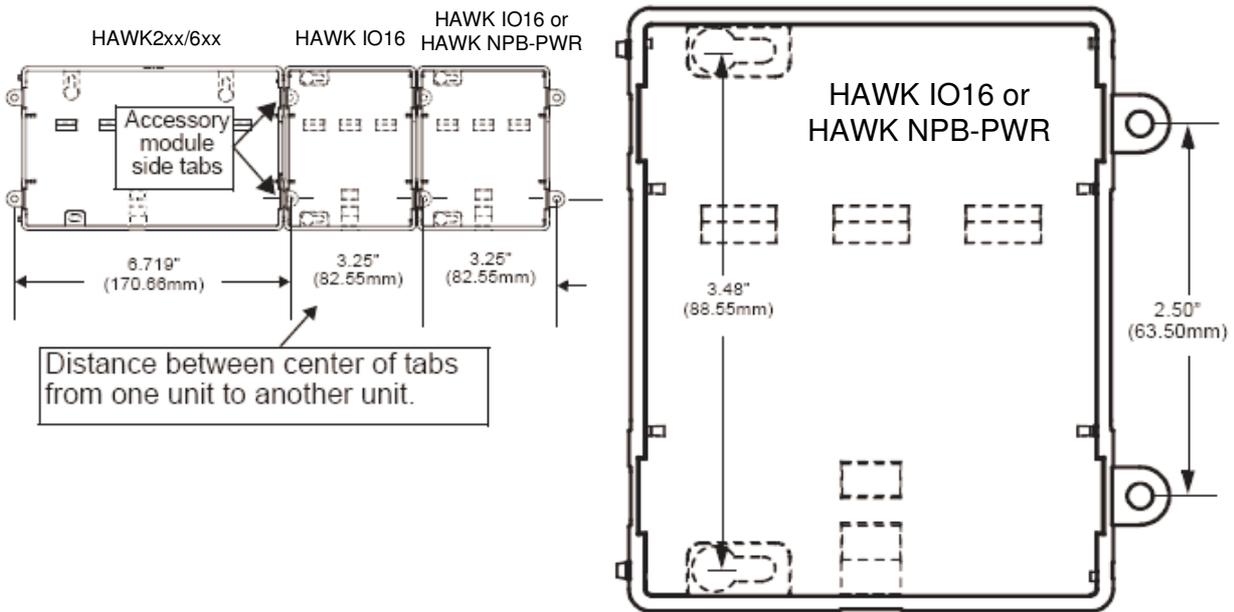
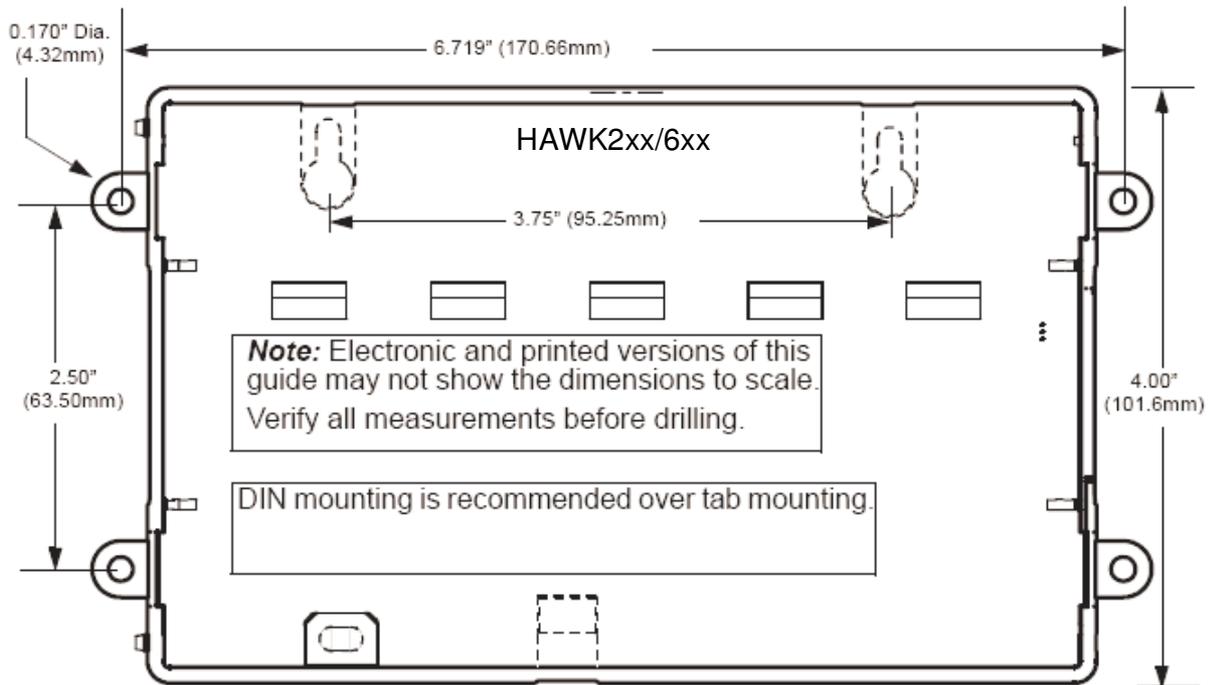
The CLAXHAWKIO16 meets certifications of the Federal Communications Commission (FCC), Canadian Department of Communications (DOC), and is included in an EC "Declaration of Conformity" for the HAWK. For further details, please see these sections in the HAWK2xx/6xx (EN1Z-0944GE51) Install Instructions.

## Related Documentation

For more information on configuring and using HAWK2xx/6xx (EN1Z-0944GE51) series controllers, consult the following documents:

- HAWK2xx/6xx (EN1Z-0944GE51) Installation Instructions

# MOUNTING DIMENSIONS



Manufactured for and on behalf of the Environmental and Combustion Controls Division of Honeywell Technologies Sàrl, Ecublens, Route du Bois 37, Switzerland by its Authorized Representative:

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