**HOA-5 and HOA-9** are 4 and 8 channel Universal Output Override Modules. They allow for up to 4 or 8 digital (relay) outputs and one analog output (0-10VDC) to be controlled manually (on or off, by the user) or automatically (by the Controller). The selection, made via a 3 position dual pole toggle switch, will allow the digital or analog output to be set one of three states, “AUTO - OFF - ON(Hand)”. Both Modules have a voltage output feedback for the Controller to detect the number of active HOA switches.

**FEATURES:**

- **Hand, Off, Auto Module** allows for loads to be controlled either manually or by the IZAC Controller.
- The 0-10VDC Analog Channel's three position toggle switch can be set to: Automatic (Controller operated), 0 volts (open), or any desirable 0-10VDC adjustable voltage output. An on-board 0-10VDC adjustable analog output source allows for manual selection of a 0-10VDC signal, via a built-in adjust potentiometer, on the analog override output.
- Using Transient Absorbers (transorbs) located between each output and ground terminal, each output is designed to protect Controller from high voltage (40VAC) transients and voltage spikes that can propagate through load connections. HOA Modules are designed to protect Controllers from surges or back voltages propagating through inductive load connections.
- Each output is fuse protected from over-current via solid state resettable 3 Amps fuses.
- Power to the module and each output channel has a high intensity Light Emitting Diode (LED) status indicator. The output LEDs are ON when the output is energized Automatically or if they are manually overridden ON.
- While HOA-4, HOA-8 Modules are designed to fit nicely together with IZAC-4 and IZAC-8 Controllers, these modules are not restricted to these controllers and can be used with other controllers that require these override features.
- The overridden channels generate unique voltage output that can be read by the Analog Input of the Controller to detect the number of active override channels.
- Can control 4 or 8 channels of Digital (Relay) Outputs and one 0-to-10 VDC Analog Output for a total of 5 or 9 channels of override capability.
- Removable terminal blocks and modular design allows for easy installation and operation.

**APPLICATIONS:**

- Manual control of loads for service operations.
- Manual 0-10VDC output adjustment can be used to test or adjust 0-10VDC devices.
- Switch voltage feedback can allow for the Controller to detect when the unit is in service or perform other program related operations.
- Internal electrical protection makes the device useful in suppressing harmful voltages in electrically noisy environments.
GENERAL:

HOA-5 and -9 electronic modules allow the installer or the operator to selectively change the state of up to 4 (HOA-5) or 8 (HOA-9) Digital Outputs and one Analog Output to operate Automatically, Overridden to be ON all the time or Overridden to be OFF. Besides these capabilities, each of the outputs and the 24 VAC power input are protected from high current draw (up to 3 Amps) by means of solid state reset-able fuses. Transors (fast response Varistors) provide additional protection from high voltage surges, electrical noise, spikes and transients.

These modules also have one built-in Analog Output Override channel. The Analog Output generated by a controller can be overridden by an adjustable 0-10 VDC output source, supplied by the HOA Module. Toggling the Analog Output switch to ON will allow the user to adjust the output to any desired 0-10 VDC signal, via a built-in potentiometer. If the switch is selected as OFF, no voltage will be produced at the output. Returning the switch to the AUTO position will put the Controller back inline with the Analog Output.

When a digital output is overridden, each overridden output will send an analog voltage to the 0-10 VDC output source, supplied by the HOA Module. Toggling the Analog Output switch to ON will allow the user to adjust the output to any desired 0-10 VDC signal, via a built-in potentiometer. If the switch is selected as OFF, no voltage will be produced at the output. Returning the switch to the AUTO position will put the Controller back inline with the Analog Output.

Solid state thermal fuses located on each output go into high resistance state due to thermal heating and protects the Digital Outputs from damage due to over current passing through them.

Each output and 24 VAC Input further has a voltage Transient suppressors that they clip any voltage spikes over 40 volts of peak amplitude. These protections are critical for reliable operation of any microprocessor based controller that is driving the outputs. By clipping high voltage and frequency transients and spikes, the effect of these electrical noise signals are reduced drastically and much safer and cleaner operation can result.

Note: Most all inductive loads, such as contactors, relays, motors, solenoids and loads alike, when they are switched on and especially switched off, can generate a very sharp voltage spikes, eventually producing damaging arcing at a high frequency (due to rate of change of voltage).

Electrical noise can travel over the 24 VAC power line and/or through the air as RF signals and can couple on to foils of PC boards causing damage or malfunctions.

Once they travel, they try to find the minimum resistive path to earth ground. During this event, the noise may disturb the balance of the low voltage microprocessor circuitry and cause damage or noise to be processed as data, resulting in unexpected operation. Often, this type instability in the processor will cause data to become corrupt and the processor to lock up in a state that it can not get out. Hence, all information and data processing can stop, outputs and inputs may freeze at undesirable states until the problem is corrected.

SPECIFICATIONS:

Electrical:

a. Number of Digital Output Channels: 4 (HOA-5) 8 (HOA-9)
b. Number of Analog 0-10 VDC Channels: 1 (Both HOA-5,-9)
c. Digital Output Select: AUTO (Controlled by a controller) OFF (No voltage, open) ON (Typically applied 24 VAC)
d. Analog Output Select: AUTO (0-10 VDC from controller) OFF (No voltage, open) ON (User adjusted 0-10VDC)
e. Digital Output Protection: Resettable 3 Amp Solid State Fuse
f. Digital Output and Power Input Transient protection: Transorb protection, Min. voltage 64.5 V peak, Peak pulse power: 600 Watts, Steady state: 2.5 Watts Response time: 5 nanoseconds
g. Override Output Signal: 0-10 VDC HOA-5: 10VDC/16 combinations; 0.625 V per bit HOA-9: 10VDC/ 8 =1.25 V per Overridden output

Input Voltage: 24 VAC ±10% Power Consumption: 0.5 VA External DC Power supply: Unregulated 12 to 18 VDC Analog Output Drive capacity: 10 KΩ load at 10 VDC Analog Feedback Output capacity: 10 KΩ load at 10 VDC Override Switches: 2 pole 3 throw, 3 Amps @ 24 VAC Input and Digital Output Terminals: 12 Terminals, 3 dedicated to 24 VAC Power Inputs Analog Input and Feed back Terminals: 5 Terminals

The HOA-5 module switch combinations will produce the following voltages on the Feedback Output:

Any one output is overridden: 1 VDC Any 2 outputs are overridden: 2 VDC Any 3 outputs are overridden: 3 VDC All 4 outputs are overridden: 4 VDC

The HOA-9 module switch combinations will produce the following voltages on the Feedback Output:

Any one output is overridden: 1 V DC Any 2 outputs are overridden: 2 V DC Any 3 outputs are overridden: 3 V DC Any 4 outputs are overridden: 4 V DC Any 5 outputs are overridden: 5 V DC Any 6 outputs are overridden: 6 V DC Any 7 outputs are overridden: 7 V DC All 8 outputs are overridden: 8 V DC

--------See fig. 1---------
Mechanical:
Each Board is 4.00” wide X 2.350” long X 1.000” high
---------See figure 3---------

Environmental:
Operation Temp range : 10 to 140 °F
Storage : -10 to 160 °F
Operation Humidity : 0 - 95% RH non-condensing
Storage Humidity : 0 - 100% RH non-condensing

INSTALLATION AND WIRING:
The HOA-5 and -9 should be mounted indoors, if possible. If the units must be mounted outside, make certain they are installed inside a well protected Electrical Enclosure that is free from moisture and contact with the elements.

If it the HOA-5 is to be used with the IZAC-4 Controller or the HOA-9 with the IZAC-8 Controller, the best way to install them is as follows:

1. First, mount the plastic tracks for both the Controller and HOA horizontally, so that the tracks line up.

2. Place the Controller and HOA into the track and insert one side of the one-piece connector into the Controller output and slide the HOA's input over the other side of the connector. The Controller's output connections will be directly opposite the HOA's inputs. 18 AWG wire can also be used to connect the Controller output to the HOA input. After the positioning the units close together over the connector, tighten the terminal screws.

WIRING:
(See Figures 1 and 2 for references made to the pin numbers)
HOA pins 1, 2, 3 are the 24VAC connections to the Controller. HOA pins 20, 21, 22 connect through to pins 1, 2, and 3, respectively. The connection from pin 1 to 20 provides a path for the External 24VAC HOT, used by the Controller. The 24VAC supply transformer is protected between pins 1 and 20 with a fuse and transorb. Pin 2 connects to pin 21, providing the path for the 24VAC Return(or neutral). The connection between pins 3 and 22 is the path for the IZAC Controller's 24VAC Internal HOT(or Input 24VAC HOT), taken from another 24VAC source transformer to drive the 24VAC loads.

Each output of the HOA-5 Module has a dedicated pair of Output and Output Common terminals for each load connection. The outputs of the HOA-9 Module have only one Output Common, shared by all of the individual load connections. Load connections from the Controller to the HOA-5, and -9 are made through these terminals for the respective Controller loads.

Pins 13 to 19 have the same designation for both the HOA-5 and HOA-9. Pins 13 and 14 provide the override feedback to the Controller. Pin 14 connects to one of the controller's 0-10V sensor inputs, pin 13 connects to sensor common. The 0-10V output from the Controller would connect to pin 15 on the HOA. The Controller's 0-10V output would then be taken from pin 16 on the HOA(the 0-10V common would come directly from the Controller). Provide Pin 17 with an unregulated +12-18VDC, rated for 30mA. Pin 13 is common for this output. Pin 18 connects to a good earth-ground, and is critical for proper transient circuit protection. Pin 19 is the 24VAC internal relay return.
FIGURE 2: HOA-9 SCHEMATIC DIAGRAM

0-10 VDC FEEDBACK OUTPUT

1-0 VDC

Outputs 2 through 7

1-0 VDC

ELECTRONIC CIRCUITRY

FUSE

TRANSORB

AUTO

OFF

ON

SW - 1

LED 1

INPUT 1

OUTPUT 1

FUSE

TRANSORB

AUTO

OFF

ON

SW - 2

LED 2

INPUT 2

OUTPUT 2

FUSE

TRANSORB

AUTO

OFF

ON

SW - 3

LED 3

INPUT 3

OUTPUT 3

FUSE

TRANSORB

AUTO

OFF

ON

SW - 4

LED 4

INPUT 4

OUTPUT 4

FUSE

TRANSORB

AUTO

OFF

ON

SW - 5

LED 5

INPUT 5

OUTPUT 5

FUSE

TRANSORB

AUTO

OFF

ON

SW - 6

LED 6

INPUT 6

OUTPUT 6

FUSE

TRANSORB

AUTO

OFF

ON

SW - 7

LED 7

INPUT 7

OUTPUT 7

FUSE

TRANSORB

AUTO

OFF

ON

SW - 8

LED 8

INPUT COMMON

OUTPUT COMMON

24 VAC EXT

24 VAC EXT

24 VAC INT

INPUT 1

INPUT 2

INPUT 3

INPUT 4

INPUT 5

INPUT 6

INPUT 7

INPUT 8

GROUND

24 VAC INT (RELAY CONTACT) RETURN

0-10 VDC OVERRIDE FEEDBACK

0-10 VDC ANALOG OUTPUT FROM A CONTROLLER

0-10 VDC ANALOG OUTPUT TO ACTUATOR

+12 TO 18 VDC

0-10 VDC ADJUST

MANUAL ANALOG OUTPUT SET POTENTIOMETER

MANUAL

ELECTRONIC CIRCUITRY

0-10 VDC FEEDBACK OUTPUT

0-10 VDC OVERRIDE FEEDBACK

0-10 VDC ANALOG OUTPUT FROM A CONTROLLER

0-10 VDC ANALOG OUTPUT TO ACTUATOR

+12 TO 18 VDC

0-10 VDC ADJUST

MANUAL ANALOG OUTPUT SET POTENTIOMETER

MANUAL

ELECTRONIC CIRCUITRY
FIGURE 3: HOA-5 SCHEMATIC DIAGRAM
**FIGURE 4: HOA-9 Single transformer for load relays and IZAC**

- J1 and J2 Jumper installed. With J2 in place the load uses the same 24VAC that is supplying power to the IZAC.

- Pins 19 and 21 must be connected for HOA LEDs to turn on when power is sent to the output.

- To Normally Open load connection.

- To Normally Closed load connection.
Jumpers J1 installed and J2 removed. Allows for two separate 24VAC transformers, one for supplying power to the IZAC and the other for the load relays.

FIGURE 5: HOA-9 individual IZAC and load relay transformers
J1 jumper provides power to the IZAC. With J2 in place the load uses the same 24VAC that is supplying power to the IZAC. When J2 is removed, the JP jumper configuration produces a Normally Open, dry contact between Output 2 and Output 2 common.

This JP jumper configuration will allow the IZAC to produce 24VAC on output 1 when the relay is energized or a N/O dry contact between the output and output common, when J2 is removed.

Pins 19 and 21 must be connected, for the HOA LEDs to function when power is applied to the output.

HOA status LEDs will be ON when power is applied to the Output, dry contact will not light the HOA LEDs.

**FIGURE 6: HOA-5 Single transformer for load relays and IZAC**

**NOTE:** The Output Common will always be HOT when jumped as shown for Output 1, with J2 in place and JP's 24 INT jumped to Com.
Jumpers J1 installed and J2 removed. Allows for two separate 24VAC transformers, one for supplying power to the IZAC and the other for the load relays.

To Normally Open load connection.

To Normally Closed load connection.

FIGURE 7: HOA-5 individual IZAC and load relay transformers
Feedback signal from HOA used to detect switch activity. IZAC Sensor Type set to 0-10V (See IZAC documentation).

0-10V output signal from the controller, routed to the HOA’s 0-10V Out. Can also come from AO4 (See IZAC documentation).

Unregulated +12VDC from IZAC used to supply power to 0-10V Override circuit on HOA.

0-10V Jumper setting for IZAC input 8

FIGURE 8: HOA 0-10V Override connections.

NOTE: The 0-10V connections shown here are the same for the HOA-9 and HOA-5. See IZAC-4 documentation for respective input connections used for the HOA-5.
NOTE: Status LEDs on the HOA boards light when 24VAC is being applied to the respective output. This condition can occur in an AUTO or ON position. Dry contact wiring, not producing 24VAC on the outputs, from the IZAC will not light the status LEDs.

FIGURE 9: HOA switch positions