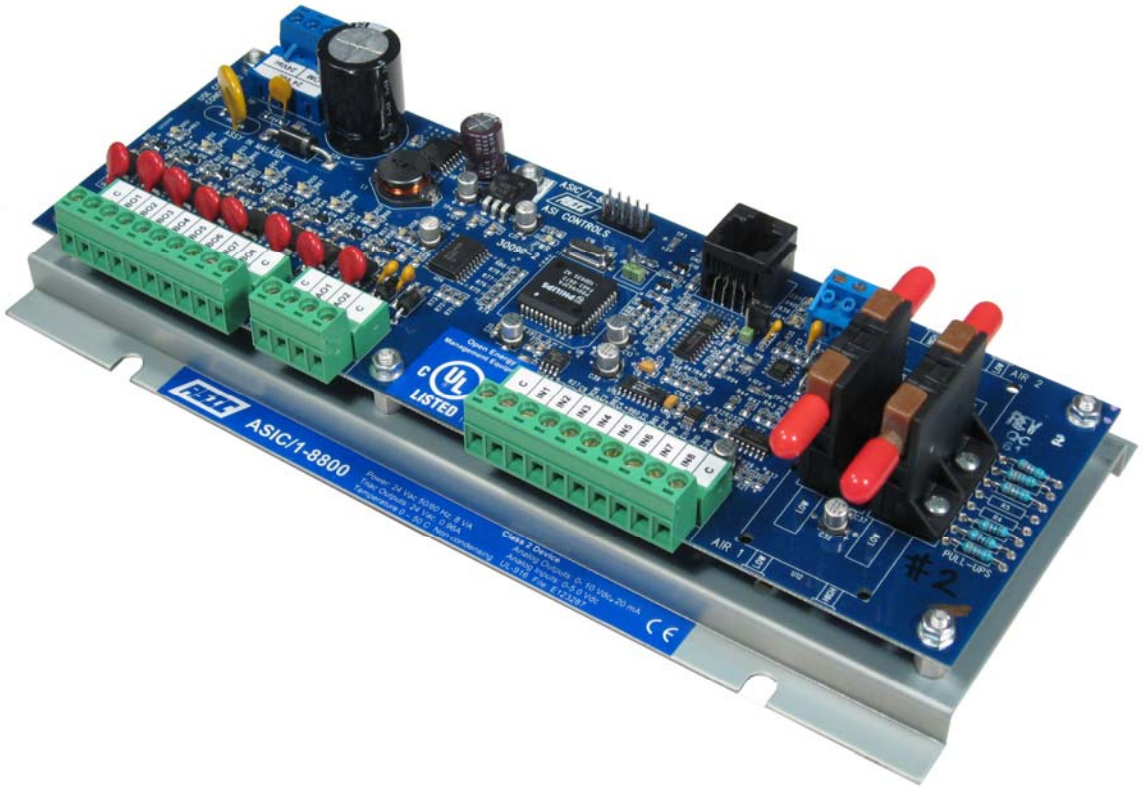
ASIC/1-8800

Installation Manual

By ASI Controls



September 2009

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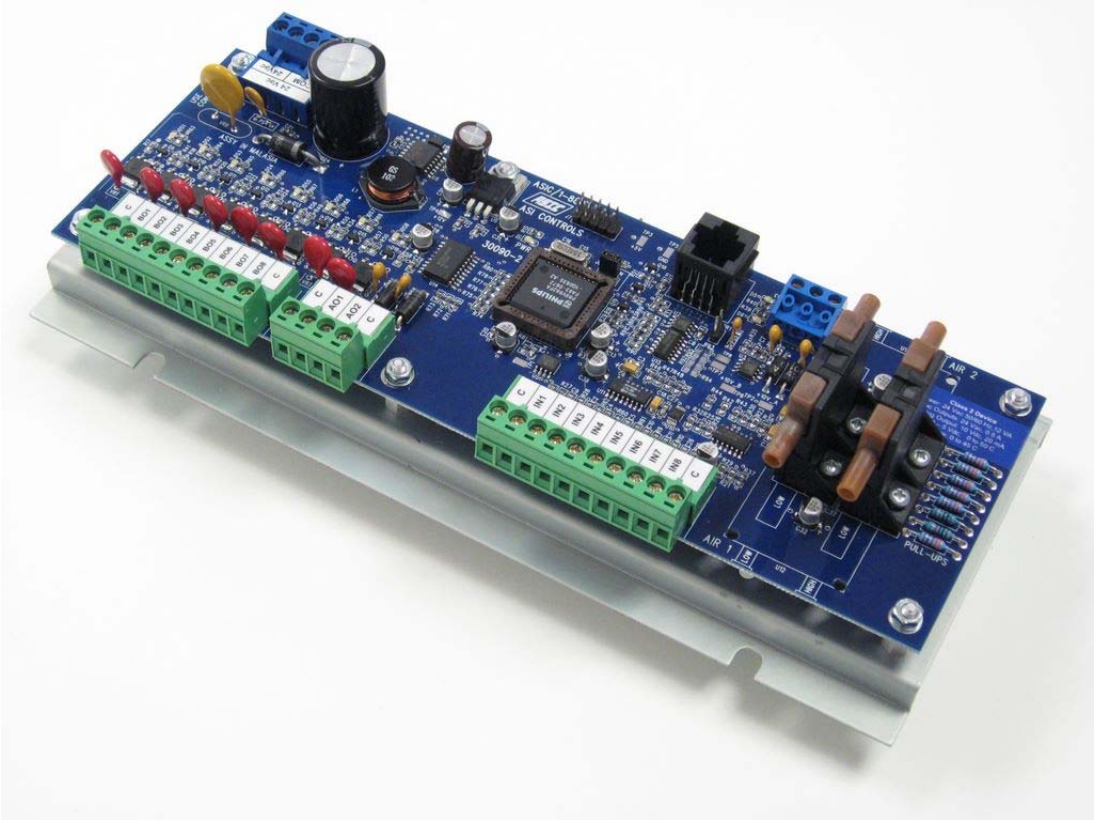
ASIC/1-8800 Introduction

ASIC/1-8800 Single and Dual Duct VAV

The ASIC/1-8800 is an application specific networked digital controller with an integral damper actuator for control of pressure independent Variable Air Volume (VAV), Fan-Powered VAV Dual Duct and Volume Tracking terminal units. The ASIC/1-8800 controller uses one or two on-board airflow sensor to measure duct airflow and maintains the space temperature by varying the air volume. The zone temperature measured through the WS-0X1 Wall Sensor is compared with the cooling and heating setpoints and used to calculate the correct air volume to be distributed to the space.

The ASIC/1-8800 comes mounted to a sheet metal base.



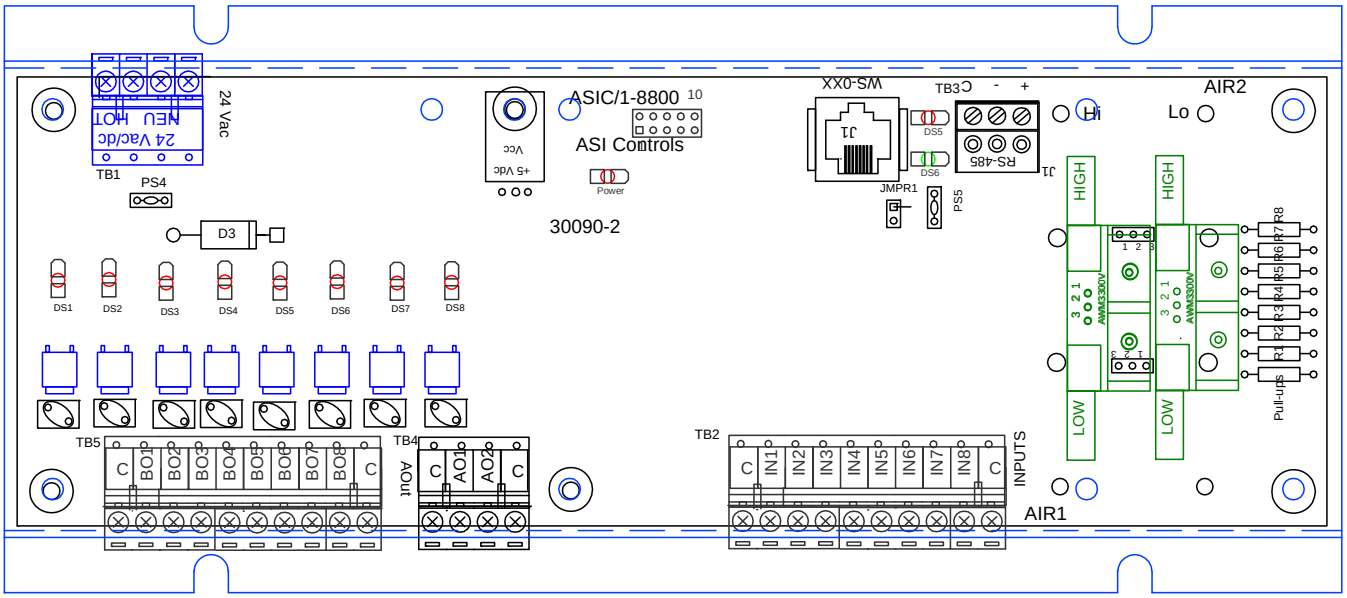
Connect the 24 Vac power. The Fan and Electric or Hot Water Heat, Primary and Secondary Dampers, and Lights are connected to triac outputs which switch the load to common as required

The ASI WS-0xx wall sensor is connected using the standard ASI SCP-xxx cable. RS-485 communication is connected to the " +" and "– " positions on the TB3 terminal block. If shielded cable is used, the shield is connected at only one end to the common terminal marked COM. The controller is given a unique address with ASI Expert software.

The controller contains the most frequently used VAV applications and has personalities for cooling only, and cooling with hot water or electric reheat, constant or intermittent fan, and Dual Duct. Volume tracking operations are also supported.

Each ASIC/1 has a 24 hour, 8 day software clock. The clock in each controller automatically sets the appropriate operating parameters based on the schedules programmed into non-volatile memory.

To use scheduled operation, the controllers must be synchronized regularly by time broadcast on the communication line by a SINC/3-3000, or ASIC/2 controller or other device. Two-way communications allows information to be transmitted throughout the control system.



Model	Airflow Sensor
ASIC/1-8800-NN	No Airflow
ASIC/1-8800-SS	Single Duct, 1 – AWM3300V
ASIC/1-8800-DD	Dual Duct, 2 - AWM3300V

Airflow

Models come with two, one, or no Airflow Sensors. The AWM3300V sensor is standard.

The AWM3300 Airflow Sensor requires an AF-001 in line air flow filter installed on the high pressure (upstream) side of the air flow sensor.

The barbed couplings are used to connect to the 0.25" FR Polyethylene plenum rated tubing that runs to the airflow measurement pickup in the duct. The normal FR-Poly tubing that runs in the plenum spaces does not connect directly to the Airflow Sensor. The Airflow Tubing Kit, ATK-10 is used to connect the sensor to the AF-001 Airflow filter, and the filter to barbed fitting that connects to the plenum airflow tubing.

Connect the filter to the high pressure (upstream) side of the airflow sensor, with 0.25" OD polyurethane tubing. . Then connect the filter with 0.25" OD polyurethane tubing to a barbed coupling to connect to the FR Polyethylene plenum tubing.

Connect the low pressure (downstream) side of the airflow sensor with 0.25" OD polyurethane tubing and a barbed couplings to the external (black) tubing. .

Optional Airflow Sensor

Optionally the ASIC/1-8800-S uses the Sensirion SDP1000-R airflow sensor. The ASIC/1-8800-DDS uses two Sensirion SDP1000-R airflow sensors. The Sensirion airflow sensor does not require a filter and the HI and Lo sides can be directly connected to the FR-Poly plenum rated tubing that go to the VAV box flow cross.

No Airflow Sensor

Optionally the ASIC/1-8800-NN uses no airflow sensor. Depending on the firmware application –NN could be used for fan coil, or for pressure dependent applications.

In this case Inputs 4 and 5 may be used for other purposes.

Dimensions

The overall dimensions of the ASIC/1-8800 controller with enclosure are 4.25" x 9.70" x2.00" (108mm x 246 mm x 51 mm) The controller with base weighs 1.0 lbm, (0.47 kg)

Agency Approval

The ASIC/1-8800, ASIC/1-8800-DD, ASIC/1-8800-SS, and ASIC/1-8800-NN has UL Listing under UL-916 File E123287 (PAZX, PAZX7).

Power Input –	Class 2, 24 Vac, 8 VA
Analog Input –	Class 2, 0 to 5 Vdc
Analog Output-	Class 2, 0-10 Vdc, 20 mA each
Triac output	24 Vac, 0.96 A each
Ambient	0 to 50 ^{o}C (122 ^{o}F) Maximum

- To be connected to a Class 2, 24 Vac, 50/60 Hz, power source only.
- Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.

Our products are manufactured in accordance with ISO 9000 standards.

The ASIC/1-8800 family has been tested and meets CE requirements under EN-EN61326-1

FCC Requirements

The ASIC/1-8800 controller, when properly installed and grounded, meets the limits for Class A computing devices as described in Part 15, Subpart J of the FCC rules. (CISPR11).

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of FCC Rules. These rules are designed to provide reasonable protection against such interference when operated in a commercial environment.

ASIC/1-8800 Hardware Features

The ASIC/1-8800 has a number of unique features.

- Two-part Screw terminals for all inputs and outputs..
- 8 Triac Outputs BO1 through BO8 switched to common for Dampers, Fan, Electric or Hot Water Heat, and or Lights..
- Two Analog outputs, 0-10 Vdc @20 mA, to control modulating heating or cooling valves.
- Self-resetting 0.5 A Polyswitch for 24 Vac power protection.
- RS-485 communication is protected with self resetting polyswitches and Transient Voltage suppressors. The RS-485 chips, U2 and U3 are surface mounted.
- Input 1 through Input 8 have pin-socketed pull-up resistors.
- Input 1 and Input 6 through Input 8 have 3.32k pull-up resistors. Input conversions for 3 kohm or 10 kohm thermistors are available.
- Input 2 and Input 3 have socketed 10 kohm pull-up resistors.
- Input 4 and Input 5 have 3.32k pull-up resistors which are removed when airflow sensors are used.
- JUMPER1 and Polyswitch, PS5, on Input 2 allows easy powering of the WS-051 Digital Display Wall Sensor.

Other Information

Grounding

ASIC/1-8800's are grounded devices and must be solidly connected to the building electrical ground through the sheet metal

WARNING: Failure to properly ground the controller may cause controller malfunction.

Storage

Store the controllers in a clean, cool, dry environment where the temperature remains between -35 degrees F (-35C) and +180 degrees F (80 C); and the humidity remains between 5% and 95% relative humidity (non-condensing).

Environmental Considerations

The ASIC/1-8800 controller must be installed where the temperature remains between +35 degrees F (2 C) and 122 degrees F (50 C);

The controller must be in a non-condensing environment. The maximum relative humidity is 80% up to 31 C (88 F) decreasing to 50% at 40 C (104 F).

Altitude up to 2000 m (6560 ft).

IEC 664, Pollution Degree 1, only dry, nonconductive pollution occurs.

Main supply voltage not to exceed + 15% of nominal voltage.

The controller enclosure is designed to be installed inside another enclosure that provides adequate protection from the environment.

Note: if the equipment is used in a manner not specified by ASI Controls, the protection provided by the equipment may be impaired.

Electro-Static Discharge (ESD)

An ASI Controller is a sensitive electronic device that can be damaged by common electrostatic discharge from the person handling it. It is the phenomenon that gives you a mild shock when you walk across a carpeted floor and then touch a doorknob

Touching the circuit board can transfer electrical charge and possibly corrupt the controller, even if the controller is not powered. It is important for anyone handling the controller to ground themselves before touching the circuit board.

Static electricity is generated from friction between two materials when two materials are separated or rubbed together. Examples can be as simple as opening a common plastic bag; removing adhesive tape from a roll or container, walking across a floor, transporting controllers around on carts, or sliding a controller on a work bench.

Fortunately, preventing ESD can be relatively easy and inexpensive. Eliminate static charges from the workplace. Properly shield controllers from static fields.

Eliminating static electricity in the workplace is accomplished by grounding operators, equipment, and devices (components and computer boards). Grounding prevents static charge buildup.

Personal grounding with a wrist strap keeps constant contact with bare skin and has a cable for attaching it to the ESD ground to drain off the operator's static charge.

A dissipative table mat should provide a controlled discharge of static voltages and must be grounded. The surface resistance is designed such that sliding a computer board or controller across its surface will not generate significant voltage.

A floor mat dissipates the static charge of personnel approaching the work bench.

Electrical field damage can be prevented keeping the metal cover on the product, or transporting products in special electrostatic shielding packages.

Product History

ASIC/1-8800 Firmware Releases

Please consult the read me file on the ASI Integrator Center web site at http://www.asicontrols.com/integrator for the latest product release information and upgrades.

ASIC/1-8800 FW880a Rev 1.0g 2009-04-09 70029-00

- Modified the Control Mode determination so that the controller:
  Enters Cooling from Deadband when the Zone Temperature is greater than the Active CLG Temp SP
  Enters Deadband from Cooling when the Zone Temperature is less than the Active CLG Temp SP by 1 degree (0.5 degree if Half Degree Enable is Yes).
  Enters Heating from Deadband when the Zone Temperature is less than the Active HTG Temp SP
  Enters Deadband from Heating when the Zone Temperature is greater than the Active HTG Temp SP by 1 degree (0.5 degree if Half Degree Enable is Yes).
- Modified IFan Heating Only feature for intermittent fan personalities so that if IFan Heating Only Enable(T6,3,bit 7) is yes, the Fan comes On in the Heating Mode when the Heating Calc is Not zero. In the Cooling and Deadband modes the Fan is Off.
- Dual Heating feature now also works with Electric Heat personalities.

ASIC/1-8800 FW880a Rev 0.4d 2009-02-23 Preliminary

o Adds Tracking VAV Personalities

About This Document

This ASIC/1-8800 Installation Manual, DOC-1682, was produced using *Doc-To-Help*®, by Component One, LCC. This manual and Windows™ help system was last revised on 2009-09-02. ASI Controls is always working to improve our products. Should you have any questions, or suggestions that would help our products better meet your needs, or that would help us serve you better, please call, write, or e-mail to:

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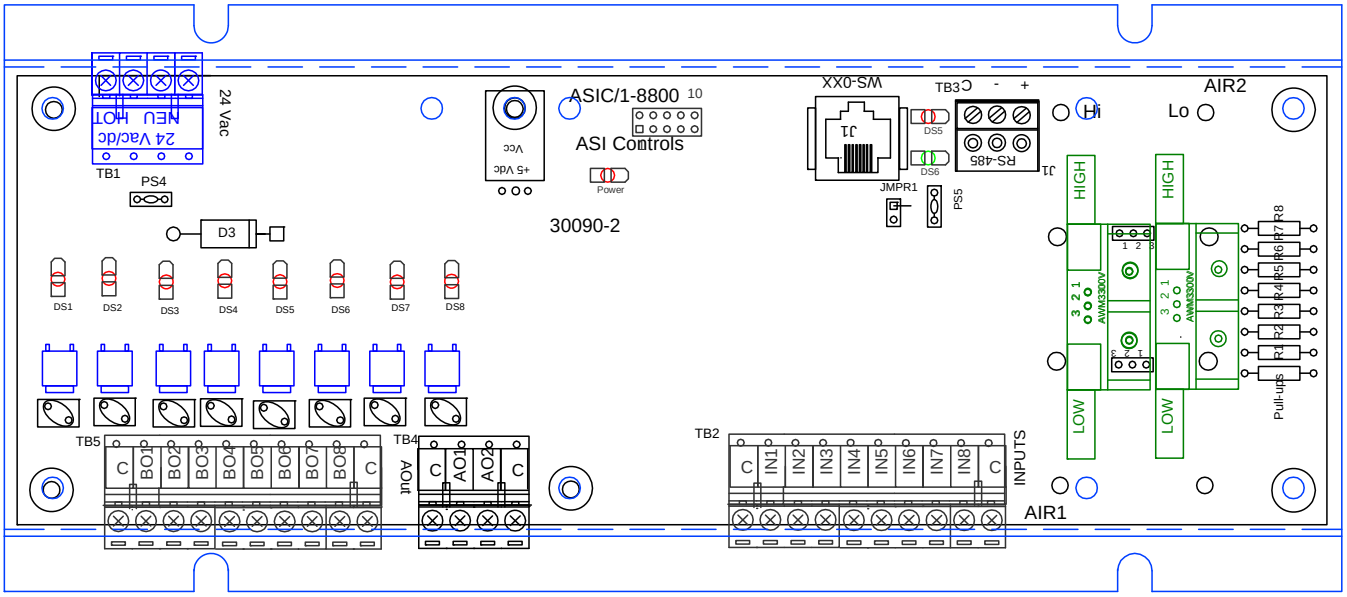
ASIC/1-8800 Wiring

General Wiring Considerations

This section describes controller input, output and power wiring details. There should not be any power applied to the controller when wiring it. Connecting or disconnecting wires to or from the controller while power is applied can cause controller malfunction and potentially damage the equipment to which it is connected.



General Concerns

The controller should be mounted outside of high voltage compartments and away from other sources of EMI. Common sources of EMI are high voltage devices (greater than 24 Vac) such as contactors, transformers, motors, light ballasts, high voltage wires and variable speed motors, and elevator drives.

The following conditions should be observed:

- To be connected to a Class 2, 24 Vac, 50/60 Hz, power source only.
- Wire connections shall be rated suitable for the wire size (lead and building wiring) employed.

The power supply wires and the output wires connected to the ASIC/1-8800 controller should be routed separately from the communication and input wiring. ASIC/1 wiring must not be routed through conduit containing high voltage wiring. Make sure all

connections to the controller are mechanically tight. Intermittent contact of connections can cause excessive electrical noise.

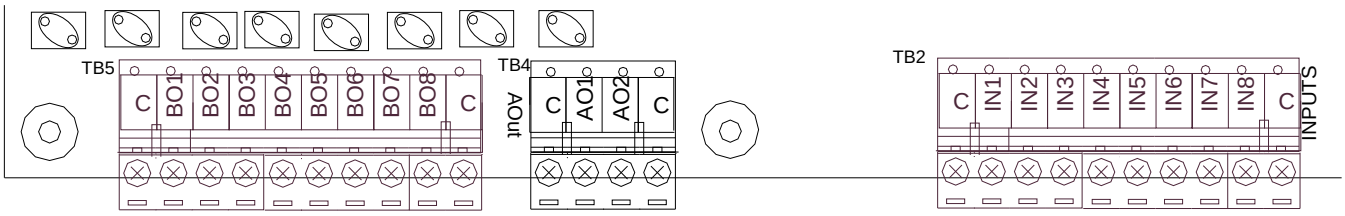
Route input, output, power, and communication wire neatly inside the enclosure. Avoid looping excess wire. Use tie-wraps to dress and bundle loose groups of wires.

CAUTION: Do NOT bundle communication and input wiring with output and power wiring. It can disrupt communication and interfere with controller input measurements.

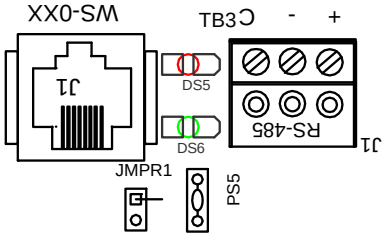
CAUTION: As with any electronic circuitry, ASIC/1-8800 is susceptible to damage caused by static discharge. The ASIC/1-8800 is self-contained in its enclosure and handling of the circuit board is not typically needed. However, if handling of the boards is undertaken, discharge static electricity by wearing an anti-static wrist band and/or grounding yourself to a well grounded metal object before touching any ASIC/1-8800 electronic components.

Connections

All input output and power connections to the controller are by means of screw terminals connectors, TB2 , TB4 and TB5, at the edge of the board.

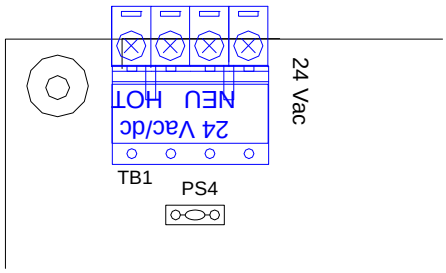


Communications are via screw terminals connector TB3 at the edge of the board, and through the WS-0XX connector J1.



24 Vac Power

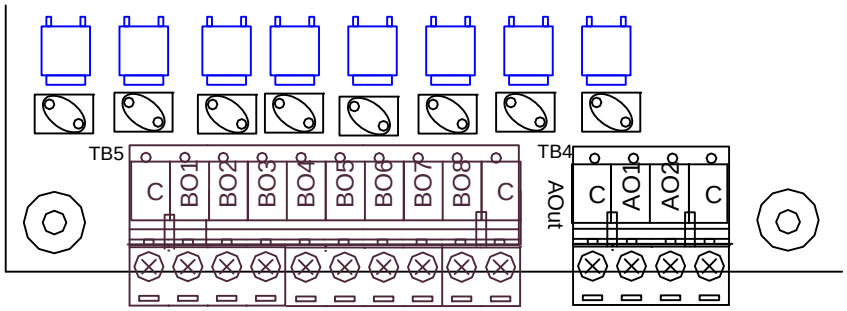
24 Vac Power is connected are via screw terminals connector TB1 at the edge of the board. The 24 Vac power connections are located on the two screw terminals marked 24 Vac HOT and the two screw terminals , 24 Vac COM which are also board ground.



Triac Outputs

Triac outputs 1 through 8 are connected to the screw terminals marked BO1 through BO8. The specific meaning for each output depends on the output mask assignments in the controller's configuration.

NOTE: Triacs switch 24 Vac to Common.



Control Power and Grounding

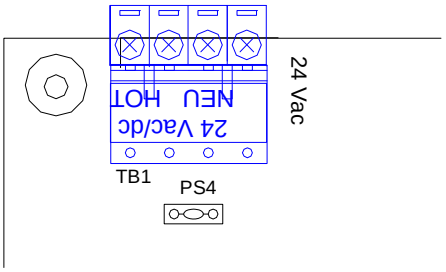
Primary Power

The power and ground terminations should be made to the screw terminals 24 Vac HOT and 24 Vac COM using wire no larger than 16 gauge and no smaller than 20 gauge stranded or solid copper wire. When making terminations with stranded wire, be particularly careful that all strands of wire are terminated inside the connector. Loose strands can short out power.

Power wiring should be routed to:

HOT, 24 Vac hot

COM, 24 Vac common, (board ground)



Control power supply specifications:

Supply Voltage:	24 Vac +/- 15%, 50/60 Hz
Power Consumption:	6 VA plus other loads
Under Voltage Protection:	70% +/- 10% line voltage brownout detect..

Power to the controller must be free of electrical noise The secondary side should NOT share a common circuit path with any relay circuits that have large in-rush currents. The 24 Vac power to the relays and contactor coils should be run separately, connecting directly at the transformer that provides 24 Vac to the controller.

To ensure that power remains relatively free of electrical noise, the primary side of the 24 Vac transformer must be connected directly to the primary power source. Avoid any common circuit paths with heavy switched loads, high current fuses or long wire runs. Large inrush currents and switched load currents are characteristic of these primary circuits and can cause substantial fluctuations in voltage to the primary side of the control transformer, adversely affecting controller performance.

CAUTION: Always turn power OFF before connecting or disconnecting controller power leads.

ASI Controls recommends that a 24 Vac transformer be installed for each ASIC/1-8800 controller. If a single transformer powers multiple controllers, polarity **must** be observed, since one side of the 24 Vac is connected to building ground. Mis-wiring will result in damage to the controller communication bus.

Controller Grounding

The controller must be solidly connected to the building electrical ground to ensure proper operation of the controller. The ASIC/1-8800 controller is a grounded device. The controller should be grounded by attaching #16 gauge wire from 24 Vac Common, TB1-4 to the grounded sheet metal of the VAV box being controlled. The controller is also grounded through the metal base.

WARNING: Failure to properly connect the controller to building ground may cause controller malfunction.

If the supply transformer is more than 4 feet from the ASIC/1-8800 controller, the wire connected to 24 Vac COM, Common, should also be grounded to building ground near the transformer. Determine which transformer wire is connected to 24 Vac Common, COM of the ASIC/1. Attach a #8 ring connector to this wire within 8" of the transformer. Secure it to a clean, non-painted, metal surface that is connected to building ground.

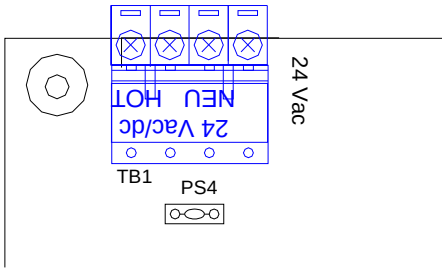
Power Protection

The controller incorporates a resettable Polyswitch, PS4, rated at 500 mA @ 60 Vac to protect the controller circuitry. When fault conditions are removed the Polyswitch resets itself.

The Polyswitch, PS4, is located just above the 24 Vac power connection at the left edge of the circuit board near the damper motor connections.

Polyswitch Specification:

ASI PN:	14036, Raychem RXEF050
Rating:	1/2 Amp, 60 Vac



LED Indication

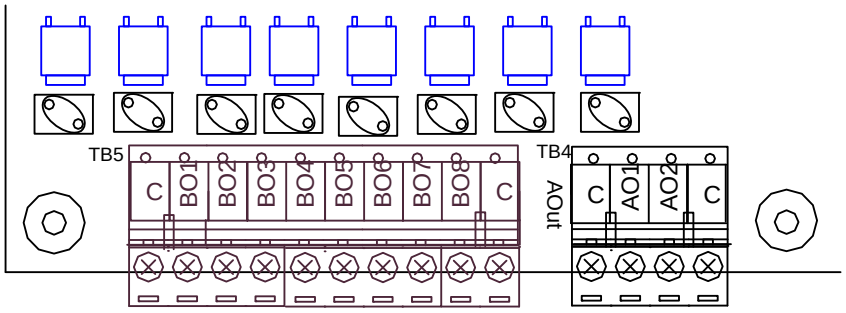
There is an Red LED located in the center of the board near J7 indicating the presence of power. This LED also blinks at 1 second intervals when an output is overridden. There are 8 Red LEDs running from the end up the center of the board near the Triacs to represent the status of the Binary Outputs. BO-01 is closest to the end of the board. Red and Green LEDs also located next to the RS-485 connection, TB3, flashes red when receiving communication packets and flashes green when transmitting.

Triac Output Wiring

The ASIC/1-8800 provides eight normally open triac outputs on screw terminals BO1 through BO8. The triac outputs **switch common.** These outputs, when energized, sink loads connected to 24 Vac HOT to 24 Vac common. Each of the triac outputs has protection provided by Metallic Oxide Varistors, MOVs.

The triac output specifications are as follows:

Maximum Voltage	24 Vac +/-15%
Maximum Steady State Current	1 Amp
Maximum 1/2 cycle inrush current at 60 Hz	10 Amp
Minimum Holding Current	15 mA



The functional assignment of the binary outputs depends on the controller personality and output mask assignments. Consult the appropriate application bulletin for the wiring and configuration details.

Connect output loads to screw terminals BO1 thru BO8 on connector TB5 using 20 gauge or larger stranded or solid copper wire. When making terminations with stranded wire, be particularly careful that all strands of wire are terminated inside the connector, as loose strands can short out power. The loads operated by these triacs must be connected to the same phase of 24 Vac power that provides power to 24 Vac HOT. These must be wired to the appropriate contactors for unit operation.

CAUTION: Always turn power off before connecting or disconnecting outputs.

There are 3 general guidelines to follow when configuring the ASIC/1-8800's output wiring.

- 1) When an ASIC/1 output is activated, it sinks its 24 Vac load through the triac to common. If the load can be switched to common and is within the ASIC/1's output specifications outlined above, you may connect the load directly to the ASIC/1.
- 2) If the load exceeds the ASIC/1's output specifications, then connect an interposing contactor or relay between the load and the ASIC/1.
- 3) If the loads require a 24 Vac source instead of sink, then connect an interposing relay or contactor between the load and the ASIC/1.

Safety Interlocks

If interlocking relays such as proof of airflow switches and other safety switches are needed in the relay circuit, they must be wired in series with the load side of the contactor circuit.

An interlocking contact must NEVER be installed in series with the ASIC/1 output triac. Opening or closing of a relay contact (without a contact suppressor) that is wired in series with the ASIC/1 output triac causes a sudden voltage change across the triac. A sudden voltage change can result in the triac energizing for up to one cycle. When the triac

energizes, it will cause the relay contacts to bounce introducing a significant amount of electrical noise.

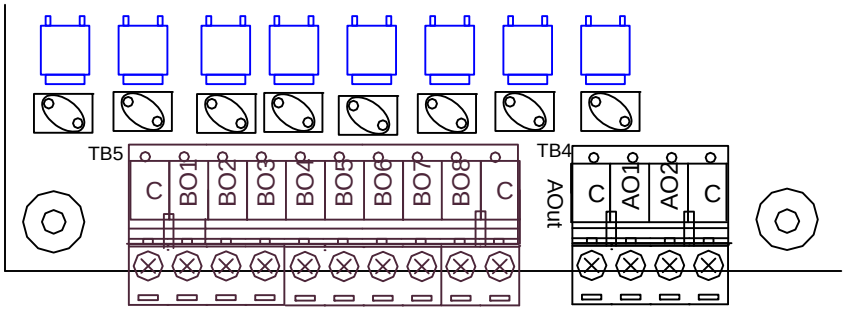
WARNING: Triac outputs must not have any mechanical contact in series with the low voltage control circuit.

Analog Output Wiring

The ASIC/1-8800 controller has two analog outputs which is capable of driving 0 to 10 Vdc at up to 20 mA

Rating: 0-9.4 Vdc, Up to 20 mA; 10 V, up to 14 mA

The analog output is connected between the screw terminals AO and marked C. The Analog Outputs are protected with Transient Voltage Suppressors and resettable 100 mA Polyswitches



The Analog Output function may be assigned to follow the Heating Requirement or the Cooling Requirement. The Minimum and Maximum Output Voltage may be set in the configuration using ASI Expert software.

Fan Speed Wiring

The ASIC/1-8800 supports ECM Motor speed control via an analog output to the EVO/ECM-ACU-O Motor Speed control.

ASM-001 Fan Speed Control

The ASIC/1-8800 does not support proportional speed control for single phase shaded pole or permanent split capacitor (open frame) via the ASM-001 adjustable speed module. If this type of controller is needed, a speed controller such as the Hoffman Controls 706-123S Series Electronic Fan Motor Speed Controller can be used to provide manual adjustable fan speed. The 706-123S Series may be used for any nominal voltage between 120 and 277 volts and is designed for direct connected propeller (blade) or blower (squirrel cage) fan type.

ASIC/1-8800 Input Wiring

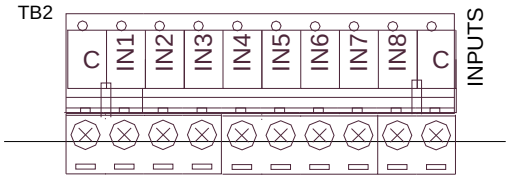
The controller has 8 universal inputs which are used for analog, thermistor, or binary (digital) inputs.

The ASIC/1-8800 inputs are connected to screw terminals IN1 through IN 8. There is an input common connection on the terminal marked C at each end of TB2.

Inputs 1 through 3 are also connected through the 8 pin RJ-45 modular Zone Sensor Jack, J1.

Inputs 4 and 5 are typically used for Primary and Secondary Airflow Sensors.

If installed, Input 4 is connected to the Primary Airflow Sensor and Input 5 is connected to the Secondary Airflow Sensor



The analog input specifications are:

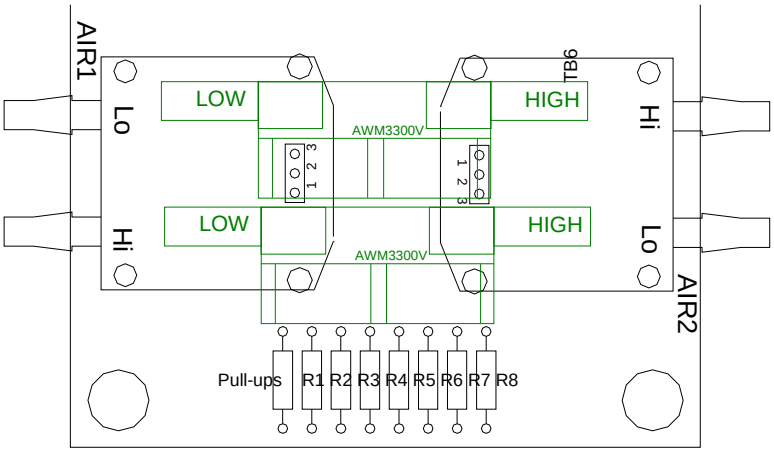
Range:	0 - 5 Vdc
Accuracy:	12 bits 0.1% full scale,
Input Impedance:	10 kohm maximum.

The ASIC/1-8800 reads to 12 bit resolution.

The ASIC/1-8800 inputs are somewhat configurable depending on the specific application. Spare inputs may be used for monitoring

CAUTION: The controller inputs are not fused. Connection of inputs which exceed the published specifications may cause permanent damage to the controller.

Input 4,5 - Airflow Sensors



A primary airflow sensor on Input 4, and the secondary airflow sensor on Input 5 are used with a properly positioned airflow crosses to monitor primary and secondary airflow. The standard ASIC/1-8800 uses the Microswitch AWM3300 Airflow Sensor. The ASIC/1-8800-DD uses two AWM3300 airflow sensors. The airflow sensors are calibrated at zero.

Proper values of K-factor and area for this primary sensor must be set in the controller. The air balancer in the field does final calibration by adjusting the velocity K-factor.

The Microswitch AWM3300 Airflow Sensor requires an AF-001 in line air flow filter is installed in the enclosure on the high pressure (upstream) side of the air flow sensor.

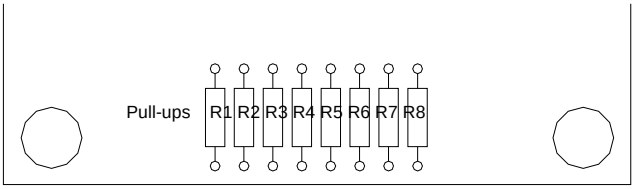
Note: The normal FR-Poly tubing that runs in the plenum spaces does not connect directly to the Airflow Sensor. The Airflow Tubing Kit, ATK-10 is used to connect the sensor to the AF-001 Airflow filter, and the filter to a barbed fitting that connects to the plenum airflow tubing.

Optionally the ASIC/1-8800-S uses the Sensirion SDP1000-R airflow sensor. The ASIC/1-8800-DDS uses two Sensirion SDP1000-R airflow sensors. The Sensirion airflow sensor does not require a filter and can be directly connected to the FR-Poly plenum rated tubing.

Input Hardware Configuration

The inputs in the ASIC/1-8800 controller are pre-configured from the factory. In most cases you will not have to make any changes. Consult the appropriate application bulletin to determine specific input requirements for your application.

The controller senses input conditions by measuring the voltage of each input relative to common (signal ground).



Inputs are referenced to the +5 Vdc supply voltage through pull-up resistors.

- Input 1 and Input 6, 7, and 8 have socketed 3.32k pull-up resistors. Input conversion options for 3 kohm or 10 kohm thermistors are available.
- Input 2 and Input 3 have socketed 10 kohm pull-up resistors
- JUMPER1 and Polyswitch , PS5, on Input 2 allow use of the WT-051 Digital Display Wall Sensor without having to install a pico-fuse.
- Input 4 has empty pin sockets. if dedicated for Primary Airflow.
- Input 5 has empty pin sockets if dedicated for Secondary Airflow.

ASIC/1-8800 Factory Pull-ups

R1 = IN-1 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN1 to + Vcc
R2 = IN-2 Pull-up (socketed) - 10.0 kohm 1% 1/4 watt IN2 to + Vcc
R3 = IN-3 Pull-up (socketed) - 10.0 kohm 1% 1/4 watt IN3 to + Vcc
R4 = IN-4 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN4 to + Vcc (None AF 1)
R5 = IN-5 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN5 to + Vcc (None AF 2)
R6 = IN-6 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN6 to + Vcc
R7 = IN-7 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN7 to + Vcc
R8 = IN-8 Pull-up (socketed) - 3.32 kohm 1% 1/4 watt IN8 to + Vcc

Inputs Assignments

The inputs for the ASIC/1-8800 pre-programmed controllers are configurable using ASI Expert software. For example both 3 kohm and 10 kohm Type II Thermistors are supported. Specific input conversions identify the Zone Temperature Sensor, and the Primary Airflow Sensor inputs. The controller interprets the voltage as temperature, airflow, etc. based on firmware and uses this information to control its outputs. The typical input assignments are described below. Unused inputs may be reassigned for monitoring. The assignment and meaning of the inputs depends on specifically how they are used in each application.

ASIC/1-8800 VAV Controller

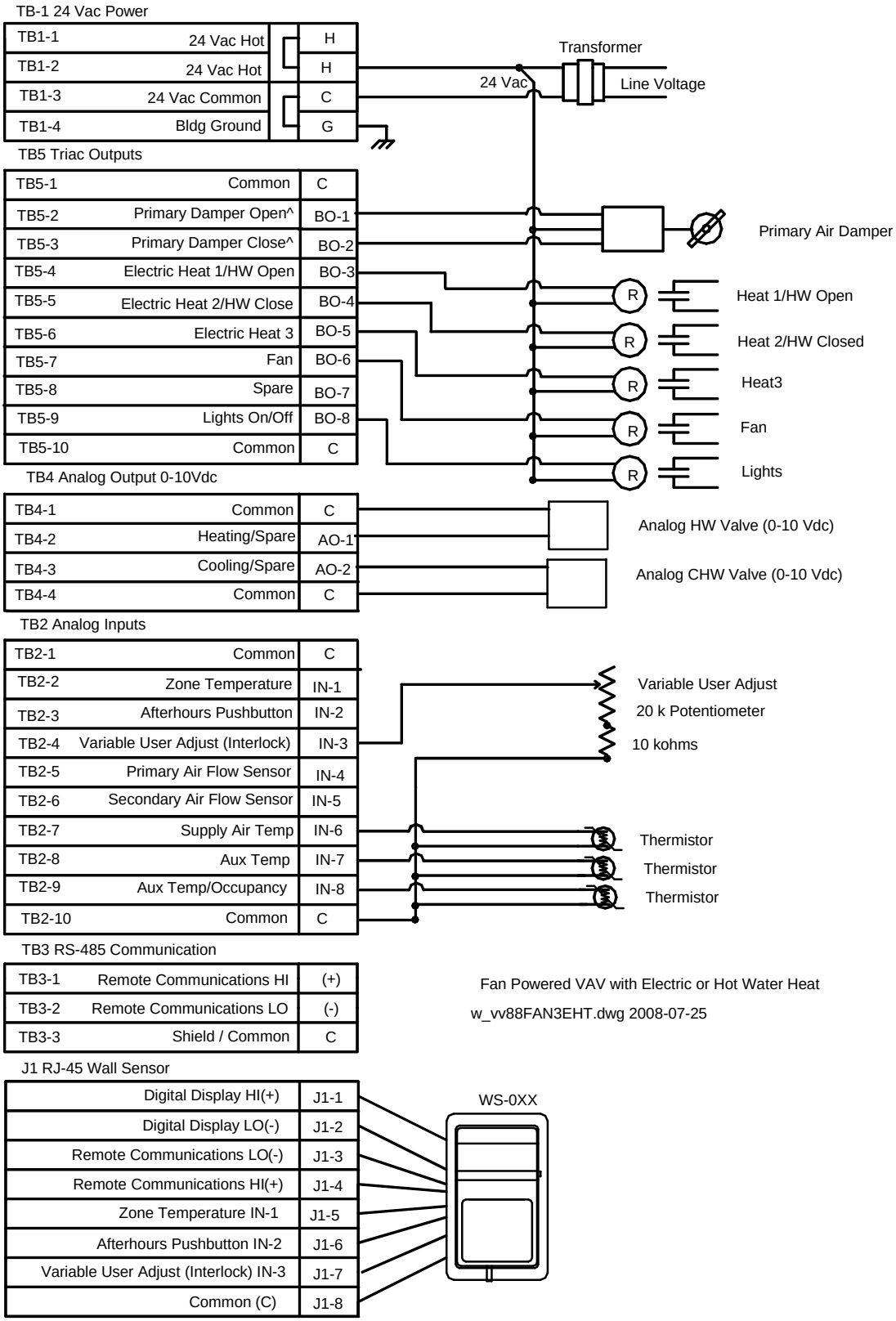
IN-1 Zone Temp
IN-2 Slide Switch & Afterhours Push-button, or digital display
IN-3 Variable User Adjust/Interlock
IN-4 Primary Airflow
IN-5 SecondaryAirflow
IN-6 Aux Temp 1, Supply Air Temperature for Changeover
IN-7 Aux Temp 2
IN-8 Aux Temp 3

Required Pull-up Resistors

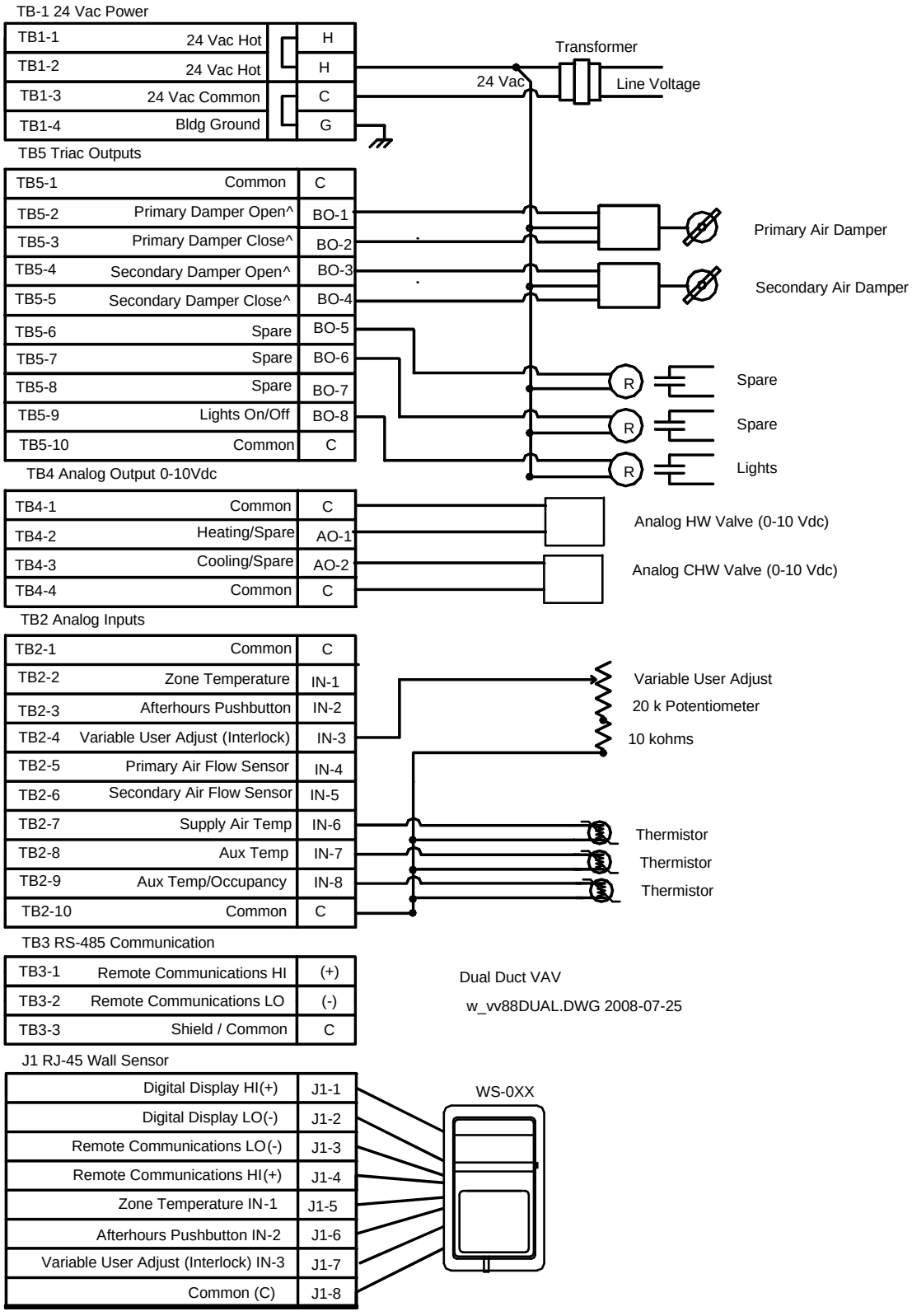
The required pull-up resistors for different types of inputs are shown below. Each input is assigned an Input Type and a Convert Type that must be appropriate to the type of input used. Default input assignments are provided in the Default brain dump table for the controller.

Input Type	**Specification**
0 to 5 Vdc	No Pull-up; Active Device
4 to 20 mA	No Pull-up; External resistor 249 ohm to common is required, 0.1%, 1/4 W, MF
Thermistor, 3 kohm Type II	3.32 kohm, 1%, 1/4 W, MF
Thermistor, 10 kohm Type II	3.32 kohm, 1%, 1/4 W, MF
Binary	(Typical) 3.32kohm, 1%, 1/4 W, MF
Airflow Sensor	No Pull-up; Active Device
Variable User Adjust	10 kohm (10 to 30k pot) (IN-3)

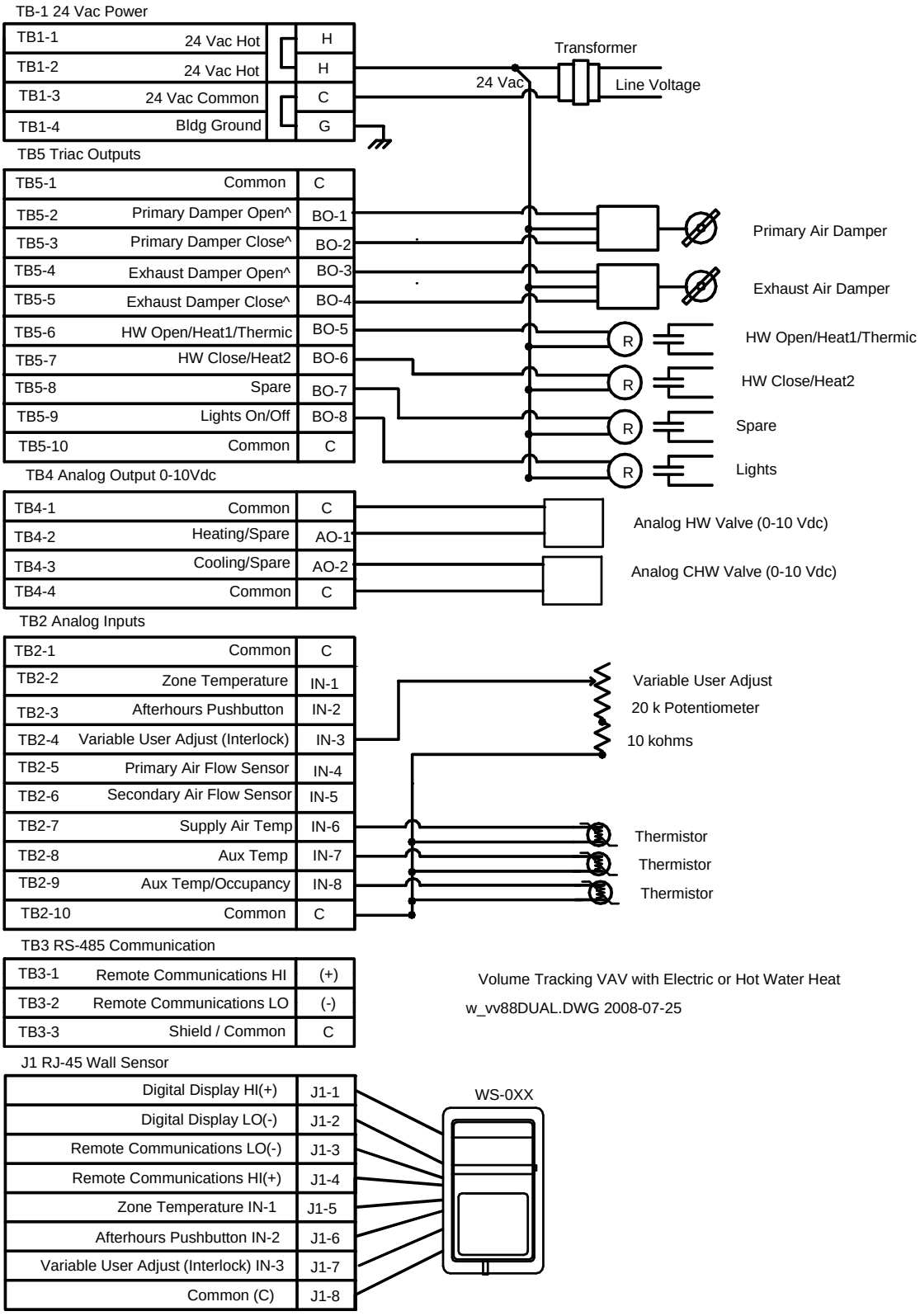
ASIC/1-8800 Fan VAV Wiring Layout



ASIC/1-8800 Dual Duct Wiring Layout



ASIC/1-8800 Exhaust Tracking Wiring Layout



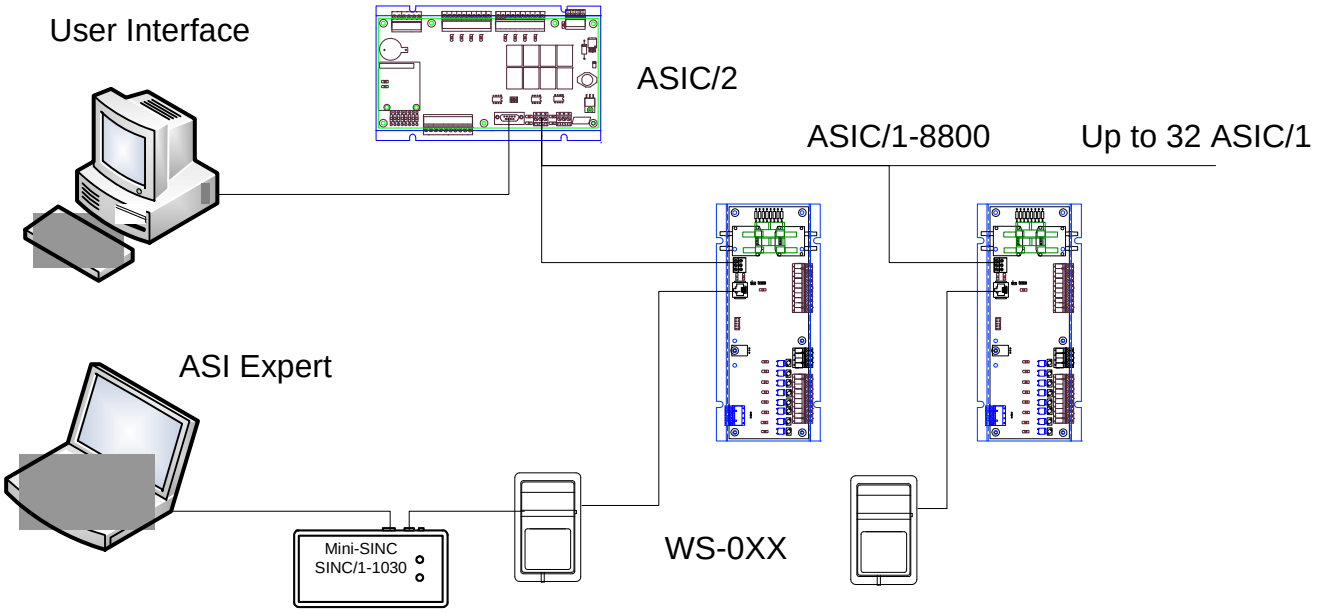
ASIC/1-8800 Communications

Communication Wiring

Communications between ASI controllers are carried on a 2-wire RS-485 communication bus. The communication line has a HI (+) and a LO (-) side, and care must be taken that every controller is connected correctly. A common connection, C, is available for connecting the shield. To avoid ground loops the shield should only be connected at one end.

A 2-wire communication cable is used to interconnect several controllers using the screw terminal connector TB3. By connecting a communication cable from one ASIC/1 to another, communications can be established with any controller on the bus. The communications should be wired in a daisy chain. Every controller on the bus hears every message.

Access to the RS-485 communication bus is through the local bus of an ASIC/2 controller, or through a SINC/1-1030 Mini-SINC connected at the WS-0xx Wall Sensor. An RS-485 communication repeater should be used on applications that require more than 32 ASIC/1 controllers on a single local communication bus. All controllers on a single communication bus should be at the same baud rate, typically 9600 or 19200 baud.



Installation Rules

RS-485 communication is noise resistant. However, a few basic rules must be followed to avoid communication problems. Taking the time to make sure communication wiring is installed properly in the beginning helps avoid communication problems latter. Make sure to observer the following communication installation rules:

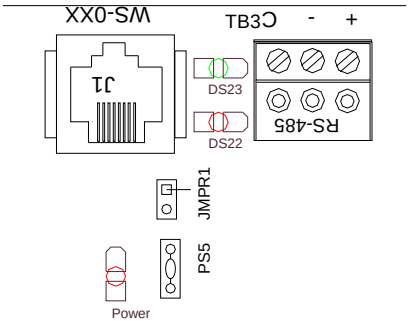
- Install only communication cable which meets the ASI Controls specifications.
- Do not run communication wiring close to AC wiring.
- Do not physically stress the communication cables, especially when pulling the communication cable around sharp bends and over rough surfaces.
- Avoid splicing communication cables. Use continuous pieces of cable between controllers.
- Use only use factory fabricated and tested wall sensor cables, SCP-0XX .
- Do NOT exceed 32 controllers on the local communication bus. If more than 32 controllers are connected together, use an RS-485 communication repeater to strengthen the signal.
- Verify communications as you go. As each controller is connected to the remote communication bus, verify communication with both the current controller, and the one previous, on the network.
- If the communication wiring is run in conjunction with AC power wiring, shielded wire should be used.
- If possible, keep communication wiring away from electrical noise sources such as power wiring, variable speed drives, large power consuming or power-generating equipment, etc. If possible communications and power wiring should cross at right angles.
- Make sure all connections to the controller are mechanically tight. Intermittent contact of connections can cause excessive electrical noise. Always route controller wiring separate from high voltage wiring to reduce the possibility of excessive EMI noise.

CAUTION: Do NOT bundle communication or input wiring with output and power wiring. It can disrupt communication and/or interfere with controller input measurements.

Connections

The following communication connections are available on the ASIC/1-8X55:

- RS-485 Communications, TB3
- Wall Sensor Communication, J1



Communication, TB3

The ASIC/1-8800 uses screw terminals, TB-3, for connection to the communication bus.. By connecting a communication cable from one ASIC/1 to another, communications can be established with any controller in the system.

Remote Communication, TB4. connections:

TB3-1 Remote (+) HI RS-485 Communication
TB3-2 Remote (-) LO RS-485 Communication
TB3-3 Common, Shield if used.

Each of the communication wires is labeled with a "+" and "-" sign indicating polarity. . The connector TB3 is two part and can be separated from the controller without disconnecting the wire.

NOTE: Maintain a consistent wiring color code throughout the communication network to prevent mis-wiring.

The ASIC/1 communication network is designed to daisy chain or star connect controllers together. Up to 32 controllers can be daisy chained together. By using two part screw-terminal connectors, a controller can be taken out of the network simply by unplugging that controller. Do NOT splice the communication line. This makes it difficult to trouble shoot.

The screw terminals are designed to be used with 16 gauge to 24 gauge stranded or solid wire.

Communication Protection

The controller communication circuitry incorporates 100mA polyswitches and transorbs to clamp the allowed voltage to protect the communication bus. The poly-switches automatically reset when the disturbance has passed and should not need to be replaced.

The RS-485 driver chips, U2 and U3, are surface mounted and require factory repair if damaged.

Communication Wire Specification

Shielded Wire

Shielded communication wire is required to meet CE certification. However even if CE certification is not required, shielded wire should be used if the communication bus wiring is run in conjunction with AC power wiring or is subject to electrical noise.

Shielded Communication wire should meet the following specifications:

Wire:	22-24 gage, solid
# of conductors:	2, twisted pair
Nominal Capacitance	
Between Conductors:	24 pF/ft
Between 1 Conductor and Shield:	42 pF/ft

Plenum Rated Cable meets these specifications and is described as follows: Tinned copper conductors; Teflon(TM) insulated; conductors cabled; Beldfoil (TM) aluminum; polyester shield with 85% tinned copper braid shield; 150V NEC 725 Class 2 for use in air plenums; non-conduit.

Note: We do not recommend using wire with more than one pair! If communication wire has more than 1 pair, then the other wires should be terminated at ground on one end to prevent induced noise.

Unshielded Wire

Unshielded Communication wire should meet the following specifications:

Wire:	22-24 gage, solid
# of conductors:	2-wire, twisted pair
Nominal Capacitance Between Conductors:	approx. 20-30 pF/ft

Wall Sensor Access, J1

The ASI Wall Sensor, WS-0XX connects using a SCP-0xx Sensor Cable to the 8 pin modular jack, J2. A second communication port is used by the Digital Display Sensor, WS-051, and requires a second RS-485 chip, U2.

WS-0X1 Access, J1 connections:

WS J2-1	2nd port (+) HI RS-485 Communication (WS-051)
WS J2-2	2nd port (-) LO RS-485 Communication (WS-051)
WS J2-3	Remote (-) LO RS-485 Communication
WS J2-4	Remote (+) HI RS-485Communication
WS J2-5	Input 1 Zone Sensor
WS J2-6	Input 2 Push-button, User Adjust
WS J2-7	Input 3 Interlock
WS J2-8	Common

The ASIC/1-8800 is designed for use with the WS-0xx series Wall sensors using the RJ-45 connector J2.

When the software asks for the address using address B455h with message MT=42 only the controllers with the hardware interlock will respond. The interlock is provided by the "loop" on the SINC/1-1030 access cord, or by shorting Input 3, as was discussed earlier.

The controller will act on messages sent to the Terminal Global address, 5A5Ah and to the ASIC/1 Global address, 5A55h. It will also respond to Device Global Addresses: 23,045 (5A 05 hex) ASIC/1VAV Controllers

The operator access is through the 6 pin modular jack, J8, on the WS-0XX wall sensor. A lap-top used for operator access is connected through the SINC/1-1030 to the modular 6-pin RJ-12 connector J8. J8 is AMP 520250-3.

Sensor Cable, SCP-XXX

The sensor cable SCP-XXX is used to connect the zone sensor WS-XXX to the 8 pin ASIC/1 modular jack, J1. The use of factory tested sensor cables is strongly recommended.

WS-R Wall Sensor

The WS-R Series Wall Sensor connects directly to the input screw terminals and does not have a communication connection. To communicate with the controller you must connect directly to the controller through the SINC/1-1030 to the terminal block, TB3, or through the black curly-cord with an 8-position connector to J1.