Use Case:

Many HVAC controls will not give specific diagnostics when a safety has tripped and locked out the system. A technician discovers that the unit has locked out but does not know if it was the LPS, HPS, Freeze Stat, or Condensate Switch that caused the issue. Being able to tell which safety tripped and when will allow the service technicians to be more efficient. Using the Analog Safety Converter 2.0 will enable a BAS to fully control an HVAC unit with without sacrificing other desired inputs while eliminating the factory proprietary controls.

This device will enable a user to read up to 4 normally closed safety switches with a single analog input. Using the correct logic, the user will be able to tell which safety was tripped and when.

Application:

This device is to be used in conjunction with a building automation system (BAS) field controller. Many controllers, such as the Automated Logic Corporation ZN551, only have 5 inputs available. These inputs are often crowded (supply air sensor, occupancy sensor, compressor status, fan status) and do not permit a system to be completely controlled by the BAS. Using the Analog Safety Converter 2.0, only 1 of the inputs are needed to effectively monitor the HVAC unit safeties.

How It Works:

The device provides a 0-5VDC signal that is specific to the safety circuit that is open. Each safety loop has a signature voltage level that is forwarded to the analog output terminal. That terminal is wired to the analog input terminal of the BAS field controller which reads the voltage level. In the extremely rare event that two safeties trip at the exact same time, the higher of the two voltage levels will be read by the controller.

Example 1:

A wall-hung Bard unit has been giving nuisance lockouts. The controls department decides to gut the controls and have complete control of the unit with a ZN551. The desired monitored inputs are:

1) Supply Air Sensor
2) Compressor Status
3) Fan Status
4) Occupancy Sensor
5) Low Pressure Switch
6) High Pressure Switch
7) Freeze Stat

With only 5 inputs, this would normally mean that two of them needed to be eliminated. This device would allow you to independently read these 3 safeties (5,6, and 7) on a single input. So, your input schedule would then be:

1) Analog Safety Signal (Low Pressure Switch, High Pressure Switch, Freeze Stat)
2) Supply Air Sensor
3) Compressor Status
4) Fan Status
5) Occupancy Sensor

Example 2:

An old 20-Ton Trane rooftop unit serving PIU boxes needs a new control board, but rather than replace the control board in the unit, the controls department decides to obtain full control of the unit with the existing SE6104 controller. The desired monitored inputs are:

1) Supply Air Sensor
2) Return Air Sensor
3) Static Pressure
4) Compressor 1 Status
5) Compressor 2 Status
6) Blower Fan Status
7) Occupancy Sensor
8) Circuit 1 LPS
9) Circuit 2 LPS
10) Circuit 1 HPS
11) Circuit 2 HPS
12) Circuit 1 FRZ
13) Circuit 2 FRZ

With only 10 inputs, this would normally mean that 3 of these need to be eliminated. This device would allow you to independently read 3 safeties on a single input. So, using two of these low cost devices, your input schedule would then be:

1) Analog Safety Signal (Device 1) (Circuit 1 LPS, Circuit 1 HPS, Circuit 1 FRZ)
2) Analog Safety Signal (Device 2) (Circuit 2 LPS, Circuit 2 HPS, Circuit 2 FRZ)
3) Supply Air Sensor
4) Return Air Sensor
5) Compressor 1 Status
6) Compressor 2 Status
7) Blower Fan Status
8) Occupancy Sensor
9) SPARE
10) SPARE

Example 3:

The controls department wants the BAS to have complete control over their water source heat pumps using ALC ZN551 controllers. The desired monitored inputs are:

1) Supply Air Sensor
2) Occupancy Sensor
3) Compressor Status
4) Fan Status
5) LPS
6) HPS
7) Freeze Stat
8) Condensate Switch

With only 5 inputs, this would normally mean that 3 of these needed to be eliminated. With a single Analog Safety Converter 2.0 device, the 4 normally closed safeties can be placed on a single input. Your input schedule would now be:

1) Analog Safety Signal (LPS, HPS, Freeze Stat, Condensate Switch)
2) Supply Air Sensor
3) Compressor Status
4) Fan Status
5) SPARE

NOTES:

EIKON file with prebuilt logic is available upon request for WebCTRL applications.

ZN Controllers: Analog input # 1 or 2 must be used on ZN controllers (these are the only inputs that accept 0-5V)

Ensure that input jumper is placed on "0-5V" or "Volts"

EIKON SETUP:

1) Paste the logic block provided in the Equipment file in the into destination Equipment file.
2) Add the COMP SAFE input to an AND block on the Compressor S/S sequence.
3) Label the safeties for the desired application.
4) Make note of the RefName (Microblock Path) of each Binary Status to use with ViewBuilder if a Safety table is desired on the graphics.

WebCTRL SETUP:

Properties Page

> I/O Points Tab - Safety Signal - I/O Type is "0-5 Volt" with "Linear Full Range", Min/Max = 0/5, Resolution = 0.1