AIPV design

The input variously described as secondary current input, 1-5 V input, AIPV, PV.

# Background and design inputs

The analog input was always present in SVI2AP and derivative hardware and was always calibrated at factory. It was

* Largely unused (except internal HART commands) in SVI2AP before 3.2.3
* Used for shutdown request (IIRC) or digital retransmit in ESD 3.1.2
* Used as digital retransmit in AP 3.2.3 (IIRC)

Factory calibration is in volts or mA (Mark and Jonathan are verifying it); we should present it in the same units as it is calibrated.

There is a wishlist requirement to generate discrete parameters for threshold excess events for this parameter; thresholds must be configurable

# Design

## Configuration

A new static TB parameter writable in MAN or OOS:

AUX\_INPUT\_CONFIG Record  
 Threshold\_LoLo float  
 Threshold\_Lo float  
 Threshold\_Hi float  
 Threshold\_HiHi float  
 Threshold\_Hysteresis float

Constraints:

Hysteresis is common and is applied to an *exit* from event.

Range values: (equivalent of) 0 to 23 mA for thresholds, 0 to 4 mA Hysteresis  
(of course they are somewhat arbitrary and negotiable).

Semantics:

A discrete value is maintained for each of the thresholds. E.g. state\_LoLo is

* True if AIPV < Threshold\_LoLo
* False if AIPV > Threshold\_LoLo + Threshold\_Hysteresis
* Unchanged if Threshold\_LoLo <= AIPV <= Threshold\_LoLo + Threshold\_Hysteresis

All thresholds are independent. E.g. it is possible to configure Threshold\_LoLo > Threshold\_HiHi; it is the user’s responsibility to configure correct thresholds.

## Runtime

New dynamic TB parameters

* AUX\_INPUT float\_s
* AUX\_INPUT\_LOLO discrete\_s
* AUX\_INPUT\_LO discrete\_s
* AUX\_INPUT\_HI discrete\_s
* AUX\_INPUT\_HIHI discrete\_s

They all share the status:

* On init – UNCERTAIN
* On sensor failure – BAD
* Otherwise – GOOD (**TBD** TB mode)

### New channels

* CHANNEL\_AUX for AI FB (MAI FB **TBD**)
* CHANNEL\_AUX\_LOLO for DI FB
* CHANNEL\_AUX\_LO for DI FB
* CHANNEL\_AUX\_HI for DI FB
* CHANNEL\_AUX\_HIHI for DI FB

# Implementation

There shall be standard fare for configuration:

* (APP) HART commands to read/write configuration
* (APP) Get/Set routines for configuration
* (APP) A debug command to read value and threshold states
* (FFP) Hooks for configuration in Write and Read handlers
* (FFP) Additions for DI and AI FB to hook to new channels (MAI **TBD**)

For runtime:

* (APP and FFP) additions to IPC command 177 to carry value, status and 4 state bits

# Expected effort

DD and GW (Bill) 1 day

APP side except IPC (Ark) 1 day

FFP side configuration (Stanley?) 1 day

IPC (Anatoly) 1 day

FB additions (?) 1 day

Testing (Terry?) 1 day