Loss of Feed Wind Up Prevention

Using Accumass Integrator PID Control Functions

Objective: To prevent PID control wind up and saturation during loss-of-feed conditions.

Equipment:
- Milltronics Belt Scale
- Milltronics Speed Sensor
- Milltronics Accumass BW500 Integrator c/w PID module
- Controlled Prefeed Device

(Also applies to Milltronics weighfeeder, or flowmeter and Accumass SF500 integrator applications.)

While every effort was made to verify the following information, no warranty of accuracy or usability is expressed or implied.

Overview:

PID control is often used to maintain a constant rate of material flow to, through, or between industrial processes. A PID control loop consists of a monitored control variable, a control setpoint, and a control action.

An example of such a system is a belt scale that measures the rate of material (control variable), compares the measured rate to the desired rate (control setpoint), and provides a PID control output to adjust the material feed to the conveyor accordingly (control action).
In this example, if the PID setpoint was 200 TPH and the belt scale only measured 180 TPH, the PID control system would attempt to increase the material feed to the belt until the 200 TPH material rate was achieved.

However, unless otherwise prevented, a loss-of-feed condition (e.g. material outage or blockage) will cause the PID control system to wind up and saturate in an attempt to match the measured rate to the PID setpoint value. This could result in unnecessary equipment wear and tear, energy consumption, noise, and excessive belt load on material feed correction.

A loss-of-feed wind up can be easily prevented using Accumass BW500 integrator functions.

Procedure:

1. Configure an Accumass BW500 integrator relay for a Low Rate alarm.
   
   i) Select a relay (1-5) to be used for the alarm.
   
   ii) Set Relay Function for Rate (P100 = 1).
   
   iii) Set Low Alarm Setpoint to the desired % of span (e.g. P102 = 80%).
   
   iv) Set Relay Alarms for low setpoint alarm only (P107 = 3).
   
   v) Set Relay Logic to negative to have closed contacts in the alarm condition (P118 = 3).

2. Configure an Auxiliary Input for PID Freeze.
   
   i) Set an Auxiliary Input (1-5) for PID Freeze function (P270 = 9).
   
   ii) Connect the Low Rate Alarm relay to the PID Freeze input.

Performance Benefits

When configured in this fashion, should the rate measured by the belt scale suddenly fall below the low alarm setpoint, the PID freeze function is activated, holding the control output at the current level rather than allowing it to wind up to saturation.

An additional low rate alarm relay may be used to activate an annunciator or indicator, prompting the operator to investigate and correct the material feed problem.

As soon as the material feed problem is corrected and the material rate measured by the belt scale rises above the Low Rate Alarm setpoint, the PID Freeze function is deactivated. The control output again varies as required to maintain the material rate at the PID setpoint value.