Tunable Empty Pipe

The Tunable Empty Pipe detection provides a means of minimizing issues and false readings when the pipe is empty. This is most important in batching applications where the pipe may run empty with some regularity. If the pipe is empty, this diagnostic will activate, set the flow rate to 0, and deliver a PlantWeb alert.

Enabling the Tunable Empty Pipe Diagnostic

The Empty Pipe diagnostic can be turned on or off using AMS Suite: Intelligent Device Manager, a 375 Field Communicator, or the Local Operator Interface (LOI) as required by the application.

Understanding the Tunable Empty Pipe Parameters

The Tunable Empty Pipe diagnostic has one read-only parameter, and two parameters that can be custom configured to optimize the diagnostic performance.

Empty Pipe Value
Displays the current value for the Empty Pipe Value parameter. This is a read-only value. This number is a unitless number and is calculated based on multiple installation and process variables such as flowtube sensor type, line size, process fluid properties, and wiring. If the Empty Pipe Value exceeds the Empty Pipe Trigger Level for a specified number of updates, then the Empty Pipe diagnostic alert will activate.

Empty Pipe Trigger Level
This value configures the threshold limit that the Empty Pipe Value must exceed before the Empty Pipe diagnostic alert activates. The Empty Pipe Trigger Level can be set to a value between 3 and 2000; the default setting from the factory is 100.

Empty Pipe Counts
This value configures the number of consecutive updates that the Empty Pipe Value must exceed the Empty Pipe Trigger Level before the Empty Pipe diagnostic alert activates. The Empty Pipe Counts can be set to an integer value between 5 and 50; the default setting from the factory is 5.

Optimizing the Tunable Empty Pipe Diagnostic

The Tunable Empty Pipe diagnostic is set at the factory to properly diagnose most applications. If this diagnostic unexpectedly activates, the following procedure can be followed to optimize the Empty Pipe diagnostic for the application.

1. Record the Empty Pipe Value with a full pipe condition.
Example
Full reading = 0.2

2. Record the Empty Pipe Value with an empty pipe condition.
Example
Empty reading = 80.0

3. Set the Empty Pipe Trigger Level to a value between the full and empty readings. For increased sensitivity to empty pipe conditions, set the trigger level to a value closer to the full pipe value.
Example
Set the trigger level to 25.0

4. Set the Empty Pipe Counts to a value corresponding to the desired sensitivity level for the diagnostic. For applications with entrained air or potential air slugs, less sensitivity may be desired.
Example
Set the counts to 10

Troubleshooting the Tunable Empty Pipe Diagnostic

The following actions can be taken if Empty Pipe detection is unexpected.

1. Verify the flowtube sensor is full.

2. Verify that the flowtube sensor has not been installed with a measurement electrode at the top of the pipe.

3. Decrease the sensitivity by setting the Empty Pipe Trigger Level to a value above the Empty Pipe Value read with a full pipe.

4. Decrease the sensitivity by increasing the Empty Pipe Counts to compensate for process noise. The Empty Pipe Counts is the number of consecutive Empty Pipe Value readings above the Empty Pipe Trigger Level required to set the Empty Pipe diagnostic. The count range is 5-50, with factory default set at 5.

5. Increase process fluid conductivity above 50 microsiemens/cm.

6. Properly connect the wiring between the flowtube sensor and the transmitter. Corresponding terminal block numbers in the flowtube sensor and transmitter must be connected.

7. Perform the flowtube sensor electrical resistance tests as outlined in the manual.

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