

# ***Achieving Target Control Performance Using Fieldbus Devices***

# Introduction

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- Overview – FF Block
- Applications that May be Addressed
  - Single loop feedback control
  - Feedforward, cascade control
  - Interlock, Input selection, Flow integration, Calculations and characterization
- Control Performance
  - Variation if Block Execution Time
  - Impact of Device Response Time and Slot Time
  - What determine Macrocycle
  - Example – Single Loop
- Splitting Control Between Fieldbus and the Control System
  - Impact on delay on loop response, guidelines
  - Future – Assigning blocks to execute in DeltaV H1 card
- Summary

# ***FF Function Blocks***

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## ***Function Blocks Addressed by FF Interoperability Testing, v4.5***

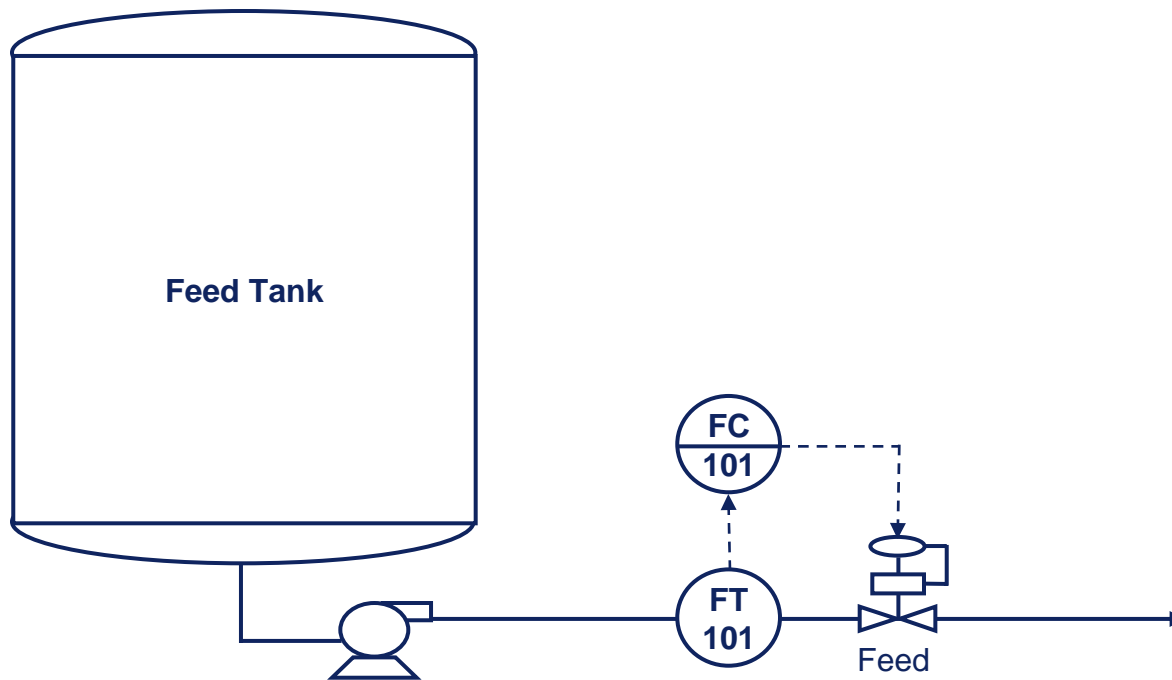
- AI – Analog Input
- AO – Analog Output
- PID – PID Control
- DI – Discrete Input
- DO – Discrete Output
- ISEL – Input Selector
- ARITH – Arithmetic
- SC – Signal Characterizer
- INT – Integrator
- MAI – Multiple Analog Input
- MAO – Multiple Analog Output
- MDI – Multiple Discrete Input
- MDO – Multiple Discrete Output

# ***Applications that may be addressed using FF function block capability***

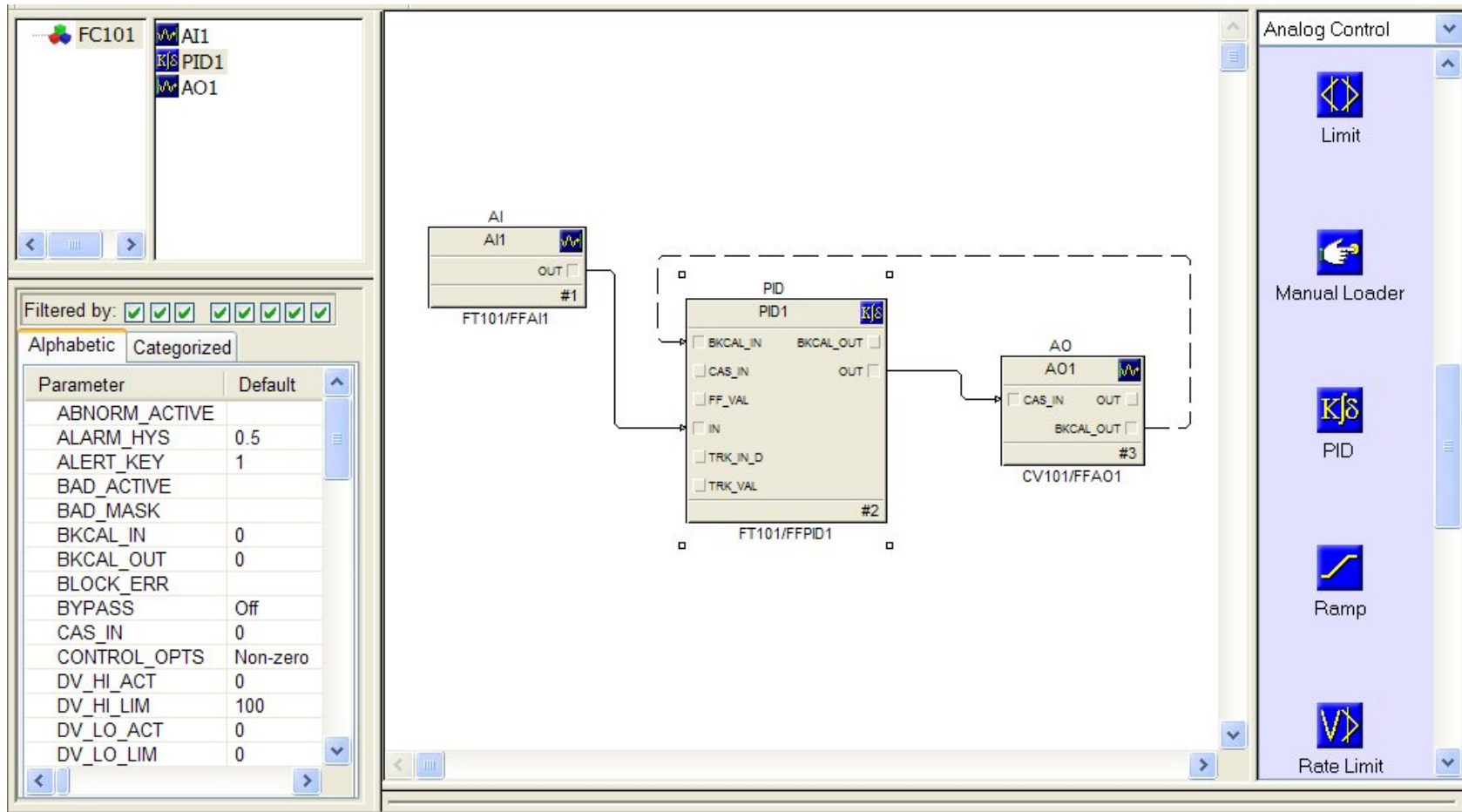
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- Single loop feedback control
- Feedforward control
- Cascade control
- Interlock based on a discrete input
- Input selection when redundant measurements are available
- Flow integration
- Calculations and signal characterization

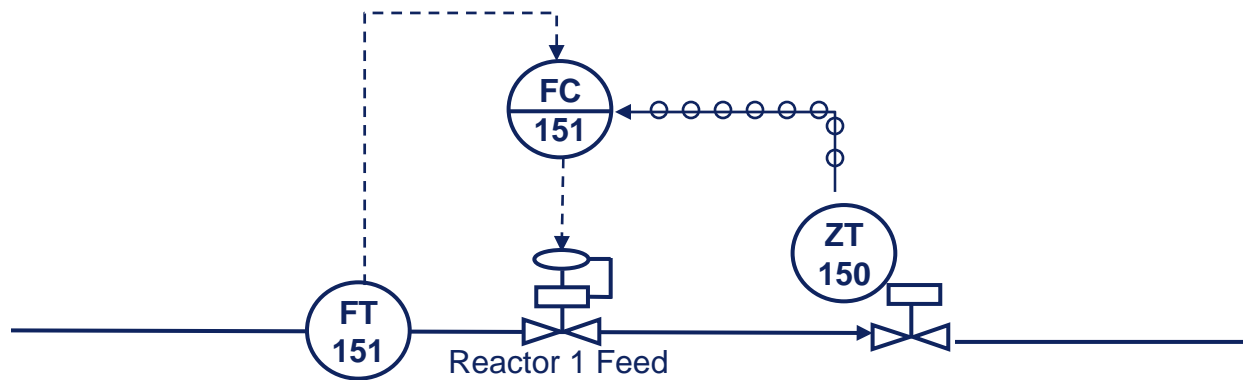
# Example: Single Loop



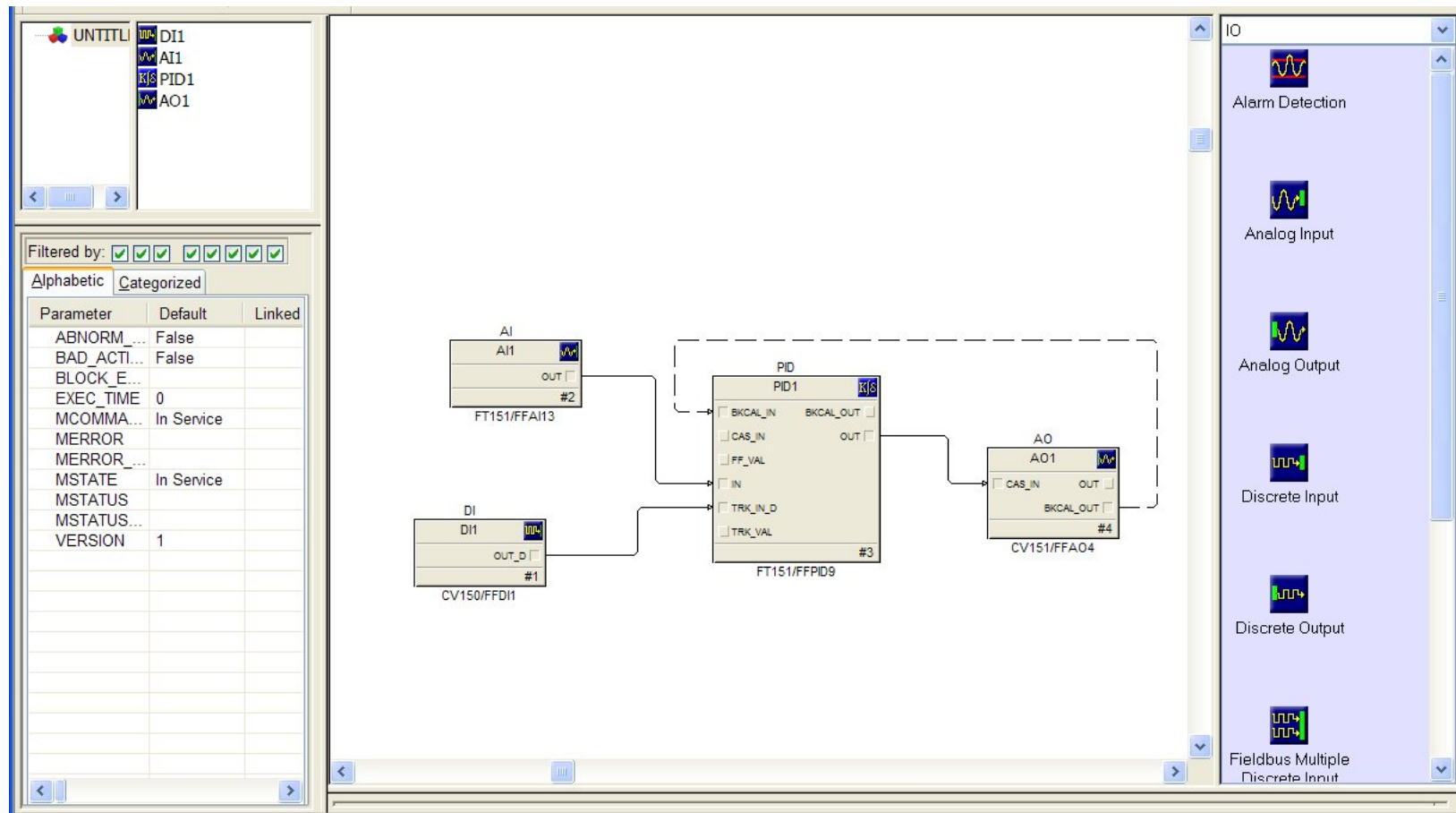
# Single Loop - Fieldbus



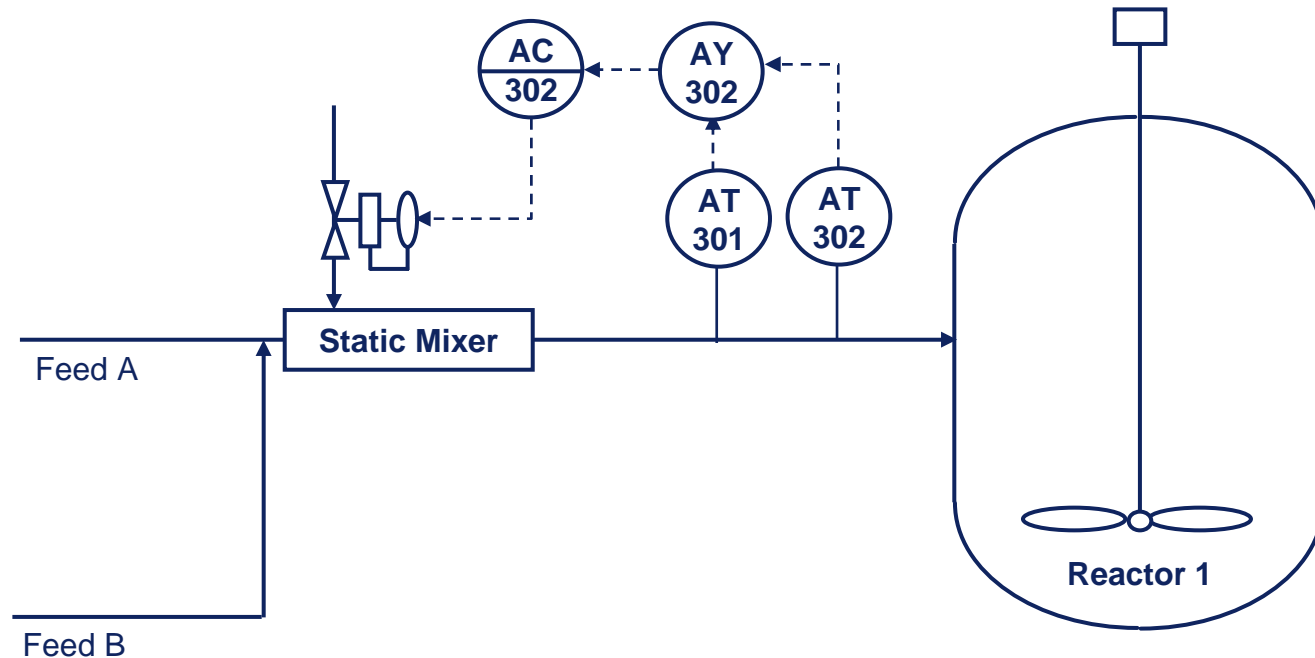
# Example: Interlock Based on Status of Blocking Valve



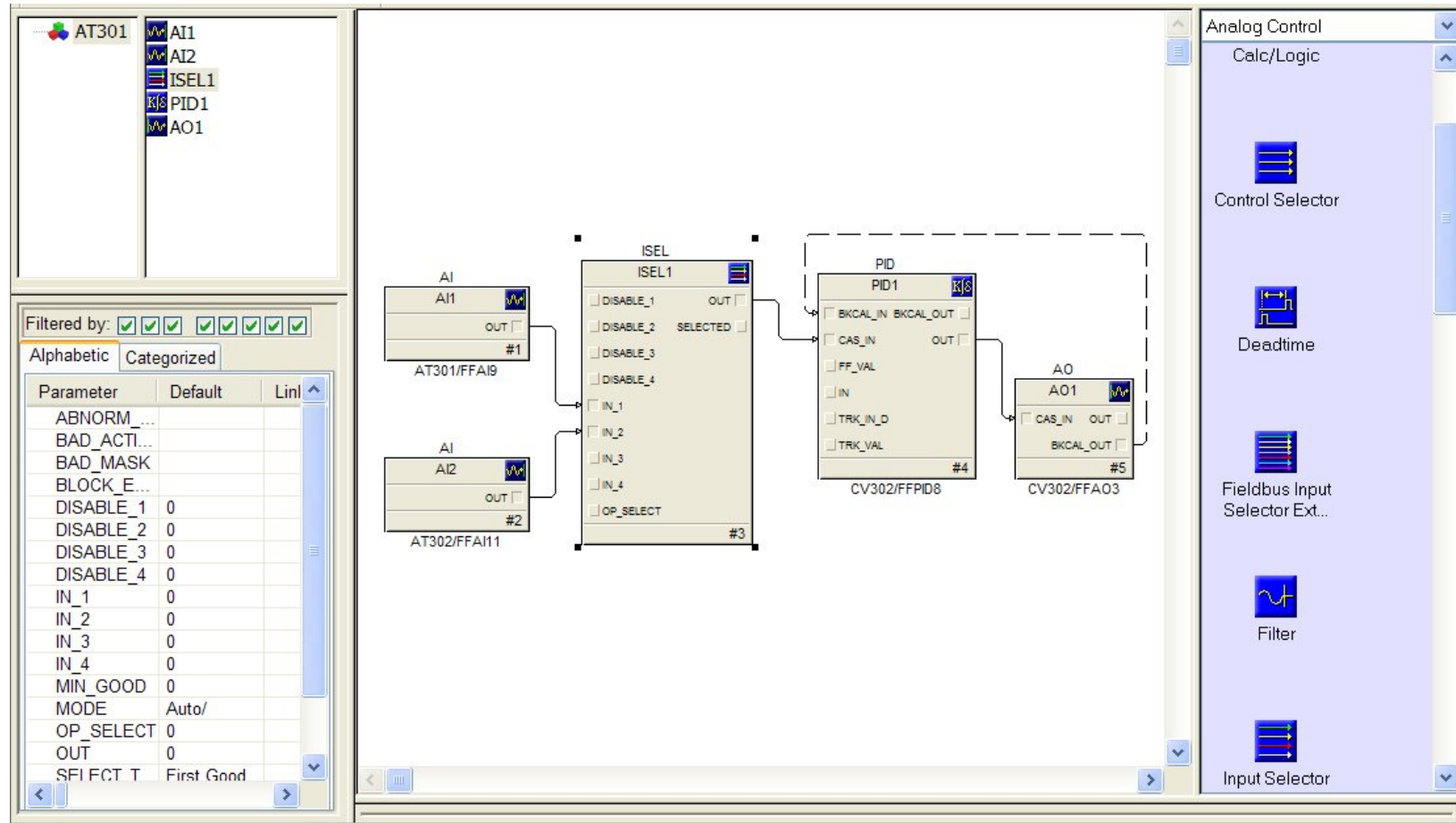
# Interlock Example: Use of Discrete Input From Upstream On-Off Valve



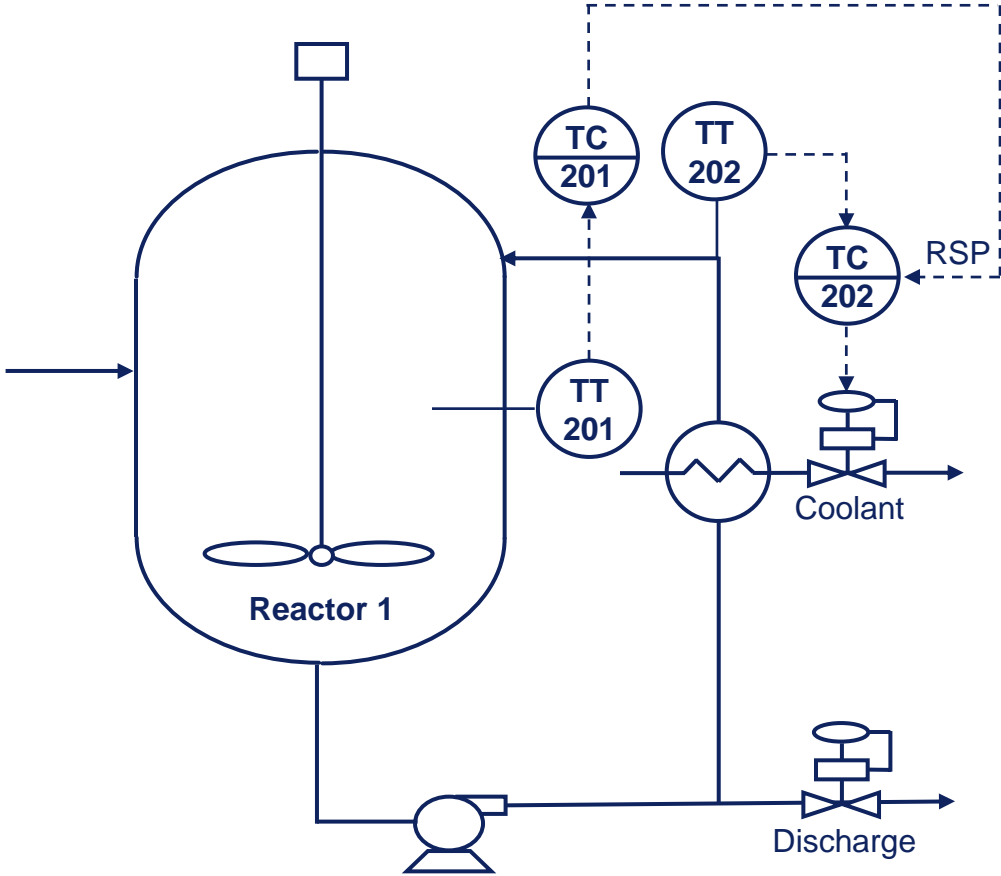
# Example: Selection of Redundant Measurement



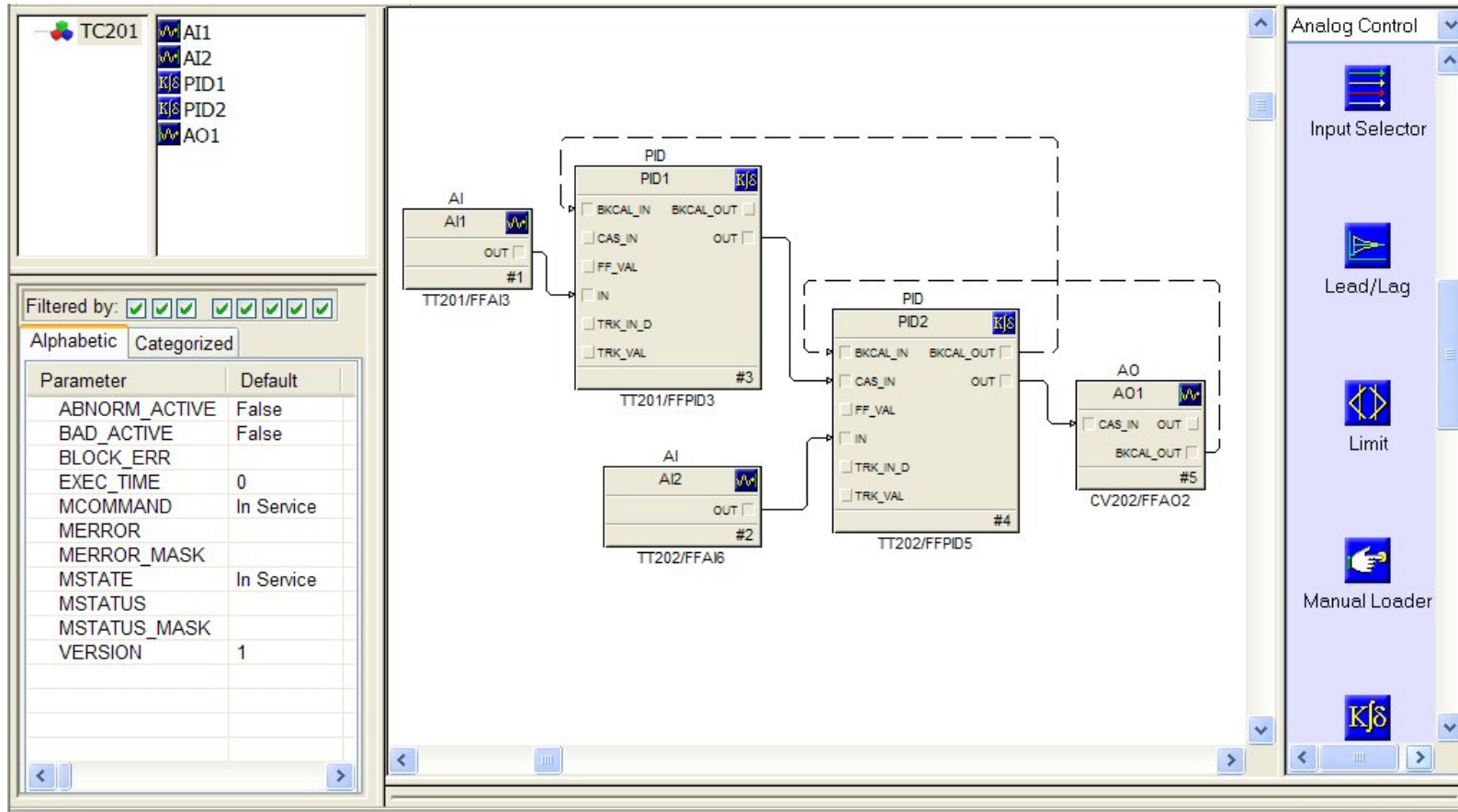
# Automatic Input Selection for Redundant Measurements



# Example: Cascade Control



# Cascades Loop - Fieldbus

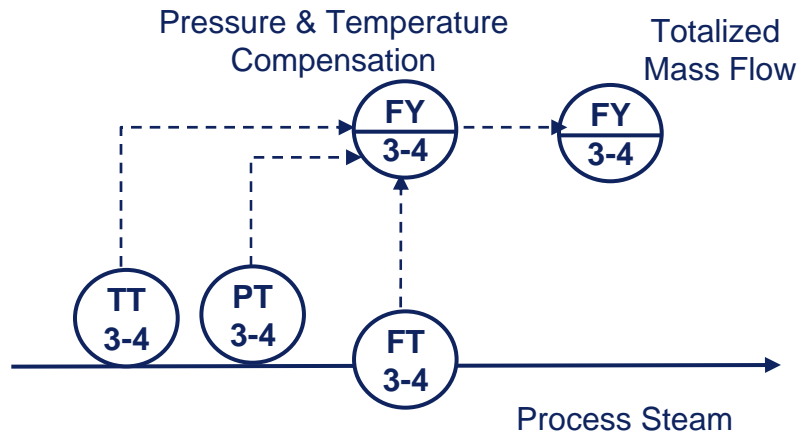


# ***Arithmetic Block May be used to address a Variety of Calculations***

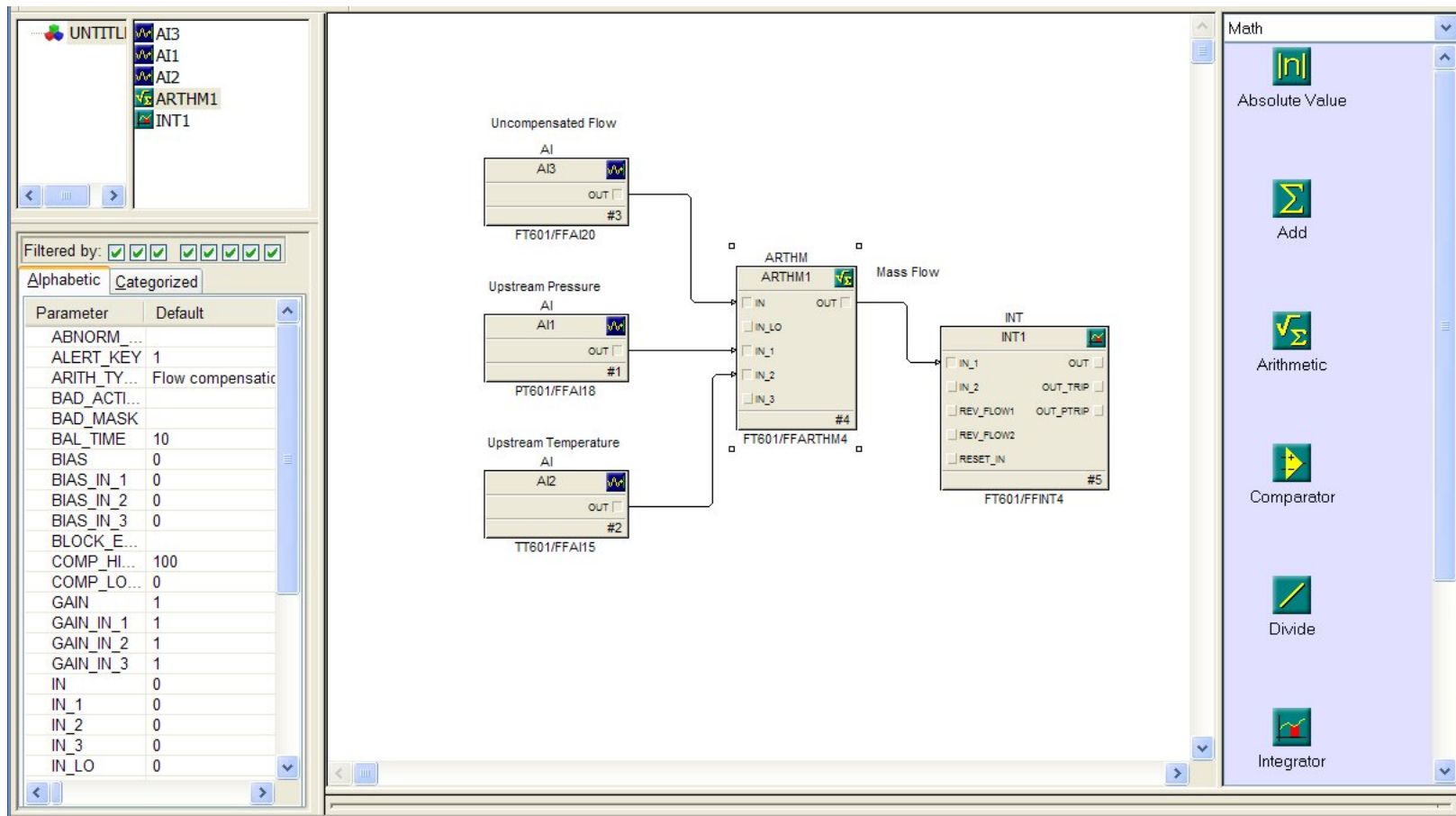
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- Flow Compensation – Linear
- Flow Compensation – Square root
- Flow Compensation – Approximate
- BTU Flow
- Multiply and Divide
- Average of inputs
- Sum of inputs
- Fourth order polynomial
- Simple HTG compensate level

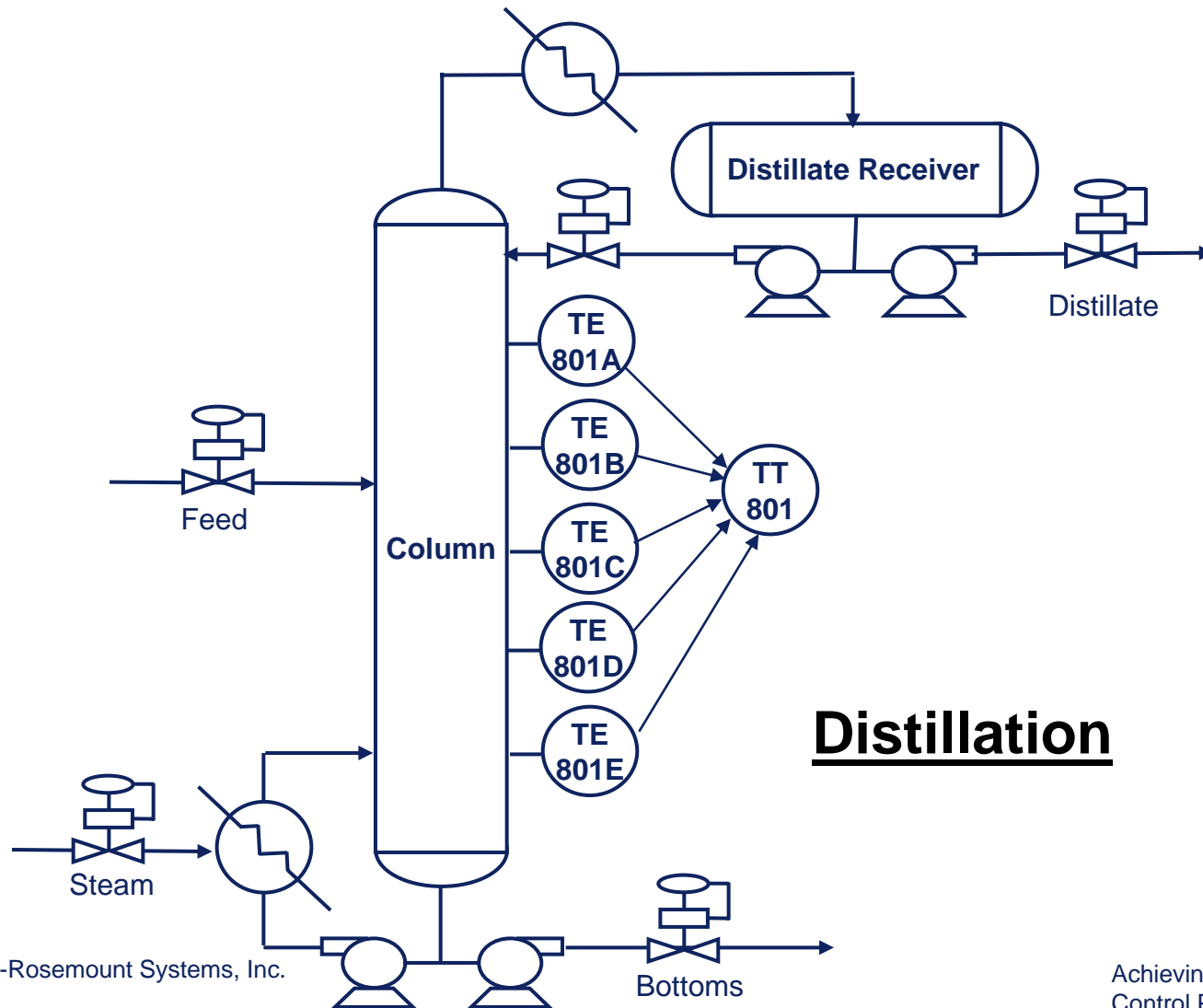
# Example: Calculation and Integration of Mass Flow



# Example: Arithmetic and Integrator Function Blocks



# Fieldbus enables Multi-sensor Applications



# Multi-sensor Applications (Cont)

## → Chemical Reactors

