



Fieldbus
Foundation

Enhanced Operations & Maintenance

Increased plant output, reduced
cost

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Smar

Topics Covered

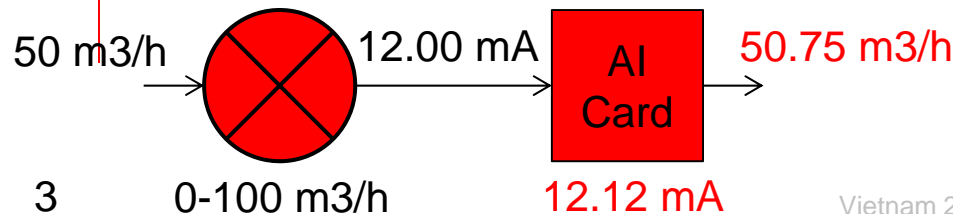
- High Signal Integrity
- Greater Signal Fidelity
- Tighter Control
- Real-time Signal Status & Data Quality
- More Powerful Devices
- Enhanced Diagnostics
- Simpler Upgrades



Higher Quality and Better Inventory Management Through Greater Accuracy

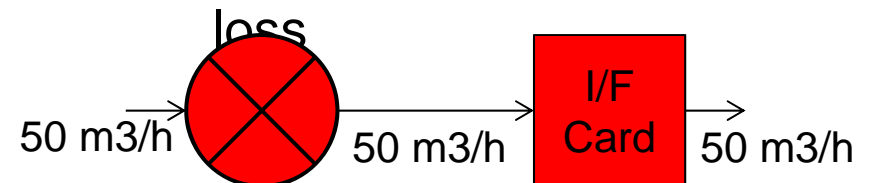
Hardwired

- Accuracy and resolution lost in 4-20 mA D/A and A/D conversions
- Mismatch in current calibration between transmitter and DCS results in error
 - (4.00 mA in transmitter reads 4.12 mA in DCS)



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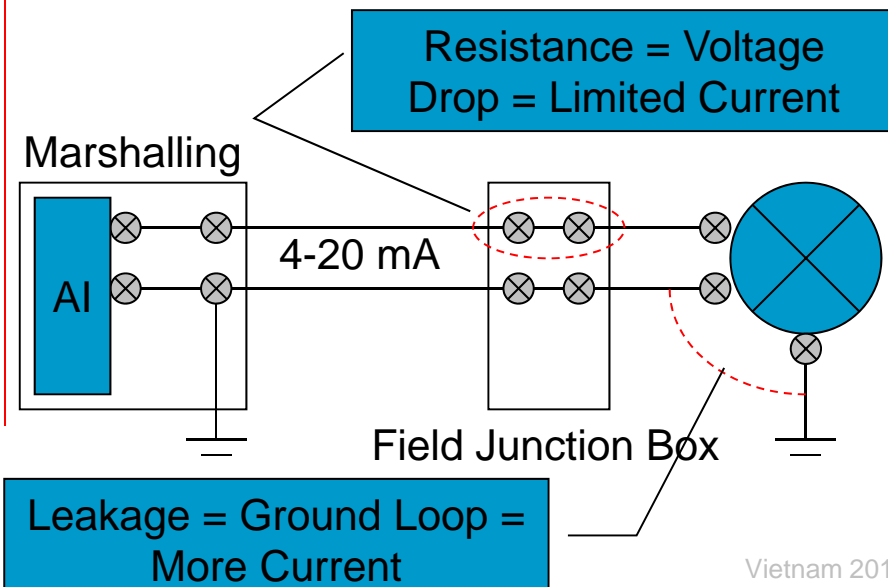
- No 4-20 mA
 - No D/A or A/D conversions
 - No current trim mismatch
- Higher accuracy
 - Particularly important in flow and level applications:



Higher Quality Through High Signal Integrity

Hardwired

- Undetected 4-20 mA “on-scale” errors:
 - Ground loop
 - Current restriction
- Distorted signal affects control loop



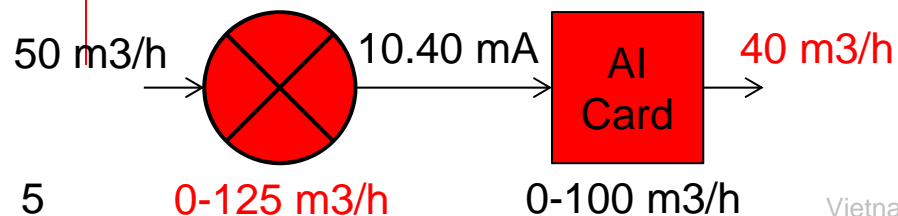
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- Measurement values transmitted digitally
 - Cannot be distorted
 - Integrity errors are immediately detected
- Any communication errors are easily identified

Higher Quality Through Greater Signal Fidelity

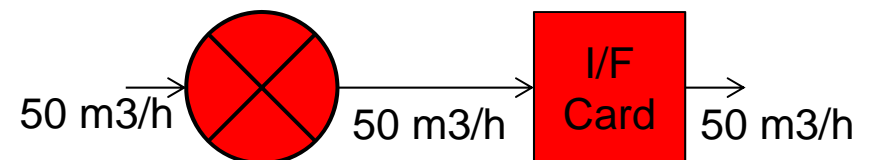
Hardwired

- Range mismatch between transmitter and DCS results in skewed reading



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- Measurements transmitted as a real number in engineering units
 - Not scaled by range
- Received unaltered by the control system
- No process variable value



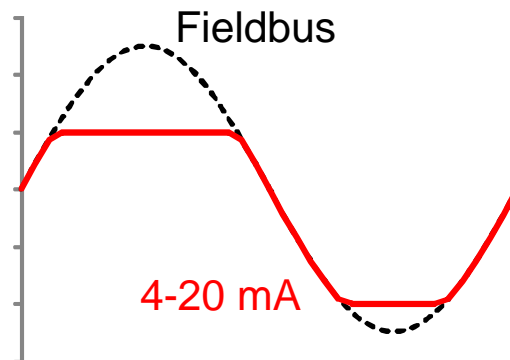
Greater Availability Through Improved Visibility During Abnormal Conditions

Hardwired

- Measurement limited to narrow 4-20 mA range
- Saturate at the normal control range

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- Measurement values transmitted over the full sensor limit
- Provide valuable data during abnormal conditions



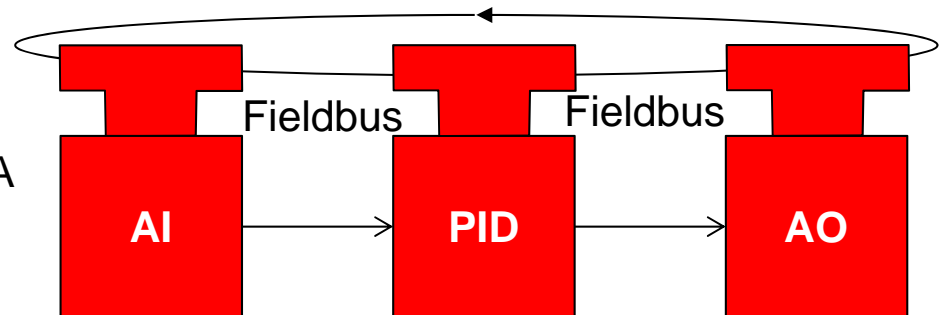
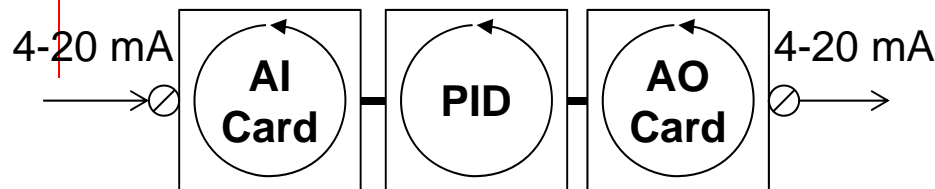
Improved Quality and Throughput Trough Digital Closed Loop Control

Hardwired

- AI and AO card scan time delays and jitter
 - Longer time “screw-to-screw”
- Affects control performance

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- Elimination of AI and AO cards
 - 150 ms control response time
- Reduced process variability
 - Improvements for each loop result in to better plant performance

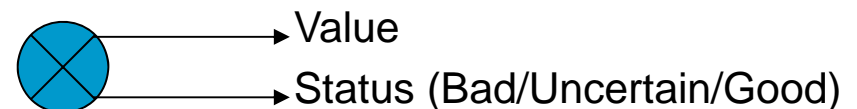
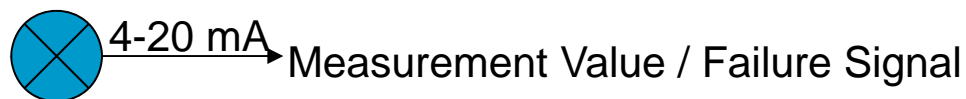


Increased Plant Availability Through Real-time Signal Status & Data Quality

Hardwired

- Bad status flagged by masquerading PV < 4 mA or > 20 mA
- Process problems not distinguished from device problems

- Real-time signal validity
 - Indicating if the value is good for control, uncertain, or bad (fault)
- Ability to distinguish process problems from device problems
 - Minimizing nuisance trips of the control loop on sensor failure
 - Increased availability



Higher Quality and Lower Cost Maintenance With More Powerful Devices

- Two-wire devices are not restricted to 4 mA
 - Bus-powered instruments allowed to consume more power
- Enabling new and more powerful functionality
 - Higher accuracy sensors
 - Diagnostics where there was none before



Two-wire Radar Level Transmitter

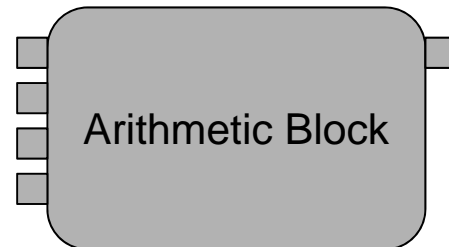
No air supply
Valve jam
Cycle count
Travel time



Intelligent two-wire on/off valves

Computation and Arithmetic in Field Devices

- Calculate or compensate in the device
 - Display on field device
 - Hydrostatic tank level "digital capillary" (two pressure transmitters instead of DP hook-up with remote seals and capillary tubes)
 - Level to volume look up
 - Look up density (volume correction factor) from temperature
 - Volume correction
 - Min selection
 - Max selection (e.g. hottest of three motor windings)
 - Average of multiple temperature or other measurements
 - DP to flow
 - Density (volume correction factor) from pressure and temperature
 - Flow correction

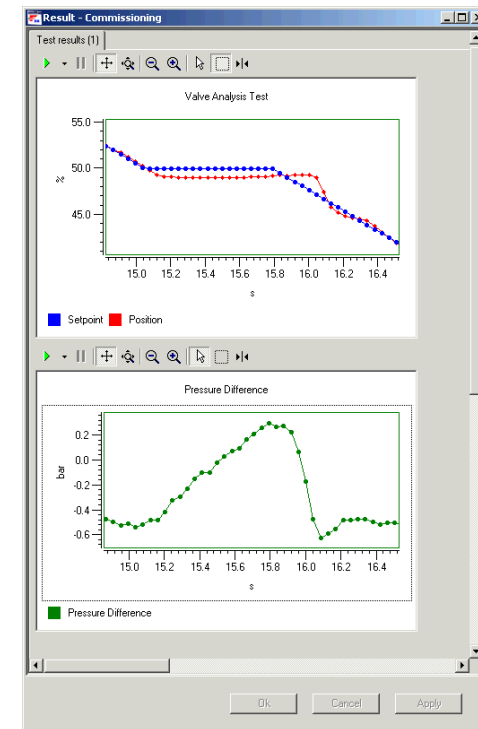
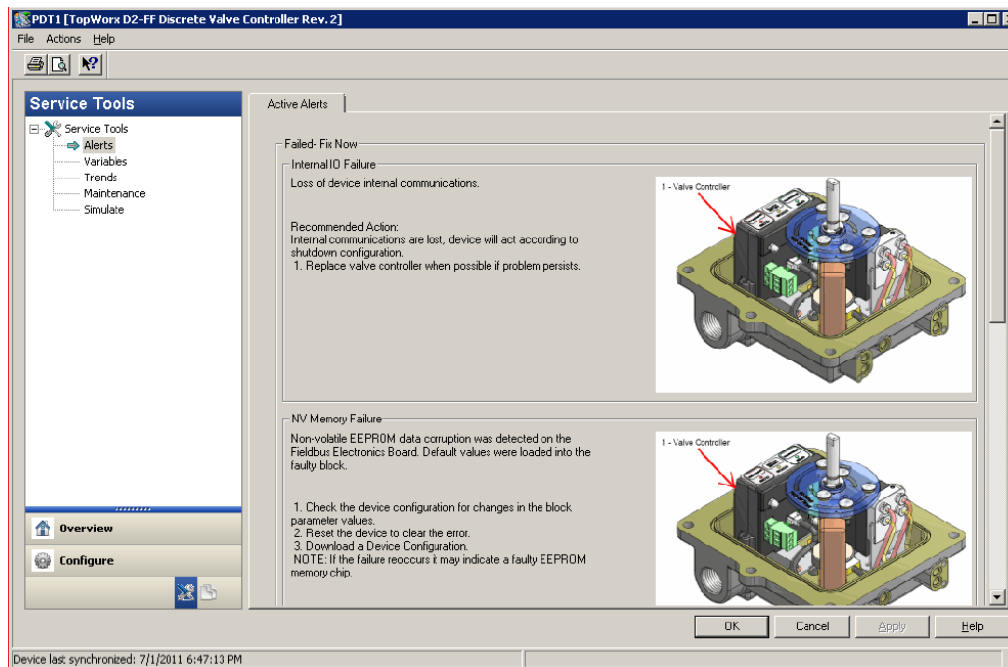


Lower Maintenance Cost Thanks to Enhanced Diagnostics

- Two-wire devices are not restricted to 4 mA
 - Bus-powered instruments allowed to consume more power
 - More power for electronics and firmware
- Enabling more sophisticated self-diagnostics in two-wire devices
 - Multi-variable statistical process monitoring (SPM)
 - From other devices on the bus
 - Continuous valve performance diagnostics
 - Not just when pushing a button

Improved Maintenance: Responsive Intelligent Device Management

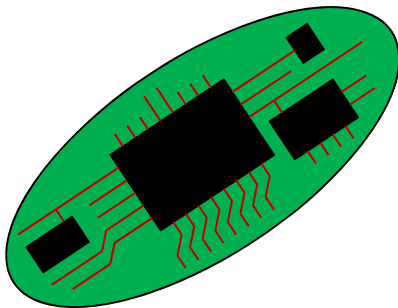
- Diagnostics and configuration/setup pages load faster than for 4-20 mA devices



Lower Cost Maintenance with Online Version Upgrades

Hardwired

- Device firmware upgrade requires:
 - Circuit board replacement; or
 - Laptop connection in the field



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- Download firmware from the system
 - While continuing to run the process
- Bumpless switch to new firmware
 - No downtime on the bus
 - No process upset
- Take advantage of new features and other improvements

Lower Cost Maintenance by Eliminating Proprietary Protocols

- Integrate with intelligent device management (IDM) software
 - For setup/configuration and diagnostics
 - Just like transmitters and valve positioners
 - Enabling predictive maintenance
 - Doing away with special software for each device type



Lower Cost Maintenance by Eliminating Proprietary Protocols

Proprietary Protocols

- Single vendor lock-in
 - Replacements for failed devices must be purchased from same manufacturer

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- Eliminates single vendor dependency
 - No problems replacing failed instruments with third-party



Where Can I Learn More?

The image shows a promotional graphic for the Fieldbus Foundation. It features a large orange and red arrow pointing right. The Fieldbus Foundation logo, which includes a globe and a stylized 'F', is positioned in the upper left. Below the logo, the text reads 'Fieldbus Foundation', 'FOUNDATION™ Fieldbus', and 'The Power of Digital for your Process Devices'. The website address 'www.ftelbus.org' is at the bottom left. A small collage of three images is at the bottom center: an industrial refinery, a worker in a hard hat, and a large storage tank. At the bottom, there are icons for Twitter, YouTube, Email, LinkedIn, Facebook, and a group of people icon.

- What is FOUNDATION fieldbus?
- Breaking the Limits of Analog Technology
- Proven Benefits in Projects Worldwide
- Enhanced Operations and Maintenance
- Ease of Use

http://www.fieldbus.org/images/stories/technology/aboutthetechology/overview/fieldbus_brochure.pdf

Fieldbus Operation & Maintenance Business Value

- Higher quality
- Greater throughput
- Greater availability (reduced downtime)
- Lower cost operation & maintenance

