Kuwait 4th Flow Measurement Technology Conference

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Hilton Kuwait Resort

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SENIOR BUSINESS DEVELOPMENT MANAGER

Flow Solutions Group

Emerson Automation Solutions

Reduce your wiring, not your expectations with Emerson's Micro Motion Model 4200 2-wire Coriolis flow and density measurement technology

EMERSON

Advantages of 2-wire Coriolis

Advantages of Coriolis Technology

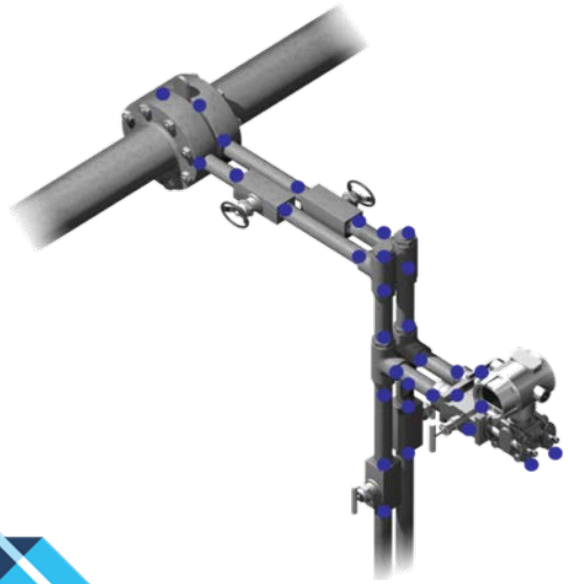
- Direct mass measurement, high accuracy, wide turndown
- No moving parts, no maintenance
- Multi-variable measurement – flow, density, temperature
- Easy installation and start-up
- No flow conditioning or straight run piping required
- Bidirectional measurement

Advantages of 2-wire Coriolis

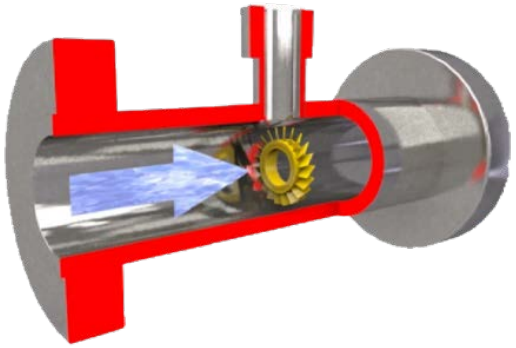
- **Eliminates cost** by using the existing wiring and without the need to install additional wiring, scaffolding, conduit, AC panels, and transformers
- **Improves reliability** by providing an accurate mass flow and density measurement
- **Lowers CAPEX** by reducing detailed engineering, planning, and installation labor cost

Conventional Flow Technologies

- Consume a large amount of available process line pressure which increases compression costs
- Can be difficult to install and require flow conditioning straight pipe runs
- Traditional methods of DP flow measurement introduce additional leak points
- Additional cost to install impulse piping



- High cost of ownership due to maintenance of moving parts
- Flow profile constrained. Energy of the fluid must be sufficient to turn the rotor in the meter
- Sudden surges of liquid or gas damage the bearings
- Damage results in loss of accuracy and eventual meter removal for repair or replacement
- Leads to production downtime



- Moving parts are subject to wear, corrosion, and erosion
- Create a significant amount of pressure drop
- Must be disassembled and cleaned if the meter plugs due to exposure of dirty or abrasive process fluids
- Leads to process downtime

Model 4200 2-Wire Coriolis Transmitter

Loop powered 4-20 mA output
2- Channels Available

SIL 2 capable single use
SIL 3 with multiple meters

Smart Meter Verification (SMV) and
Zero Verification Included

Integrated Data Historian
Real Time Clock

Integral and Remote Versions
Wireless THUM Adapter Option

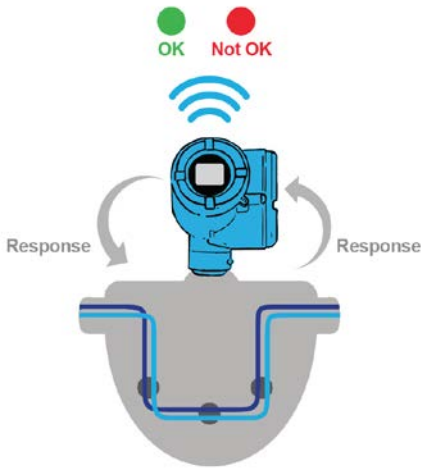
Software Rotated Display
Fully Configurable

	Channel A	Channel B
4200 (2-Wire)	Loop powered 4-20 mA-HART	4-20mA/FO/DO

Smart Meter Verification

Benefits of Smart Meter Verification

- In-situ testing of meter integrity
- Process for verifying tube integrity
- Verifies all transmitter electronics
- On demand or automatically scheduled, at meter or remotely
- Maintaining SIL Level



SMART METER VERIFICATION

Zero Verification

Importance of doing the right Zero

- Performing a Zero under unstable process conditions can introduce uncertainties into the measurement
- Emerson's Model 4200 includes embedded Zero Verification tool to bring confidence to this process
  - Before zeroing a meter, run Zero Verification!
  - Checks block in process stability
  - Analysis algorithm provides recommended action

Fully Configurable Display with Integral or Remote Versions

2-wire Coriolis Transmitter Model 4200 Display

- Meter can be fully configured
- Capacitive touch buttons (no push buttons)
- Rotate without removing front cover
- 17.75V Lift Off Voltage requiring 1V for Backlight Display

The display can be rotated without the need to remove the front cover

1 2 3

Integral

Integral

With Wireless THUM Adapter Option

Remote

Remote

With Wireless THUM Adapter Option

2-wire Coriolis Applications

Where should you prefer 2-wire Coriolis…

Category	Description
Performance	The specification for mass flow, volume flow, and density are not degraded with 2-wire. The Model 4200 offers at best depending on the sensor it is paired with: 0.10% on liquid mass flow 0.25% on gas flow 0.0005 g/cc on liquid density
Process Conditions	
Entrained Air	Do not use any 2-wire transmitter in multiphase applications
Density	< 1.4 g/cc
Viscosity	< 500 centipoise
Gas Flow Rate	High velocity gas limit is 0.2 Mach

Model 4200 – the 2-wire Coriolis transmitter

Project Certainty

We combine innovative technology and engineering to improve **capital efficiency** and boost **project schedule** reliability—helping to address the billions of dollars lost due to project excesses each year.

Operational Certainty

Our technology- and engineering-based program is designed to help industrial companies achieve Top Quartile performance and recover more than $1 trillion* in **operational** losses globally.

Plantweb

Our Plantweb digital ecosystem provides a robust portfolio of hardware, software, intelligent devices and services for securely implementing the Industrial Internet of Things, with measurable business performance improvement.

Lowering CAPEX for Projects

AC power expenditures that 2-wire could turn into savings

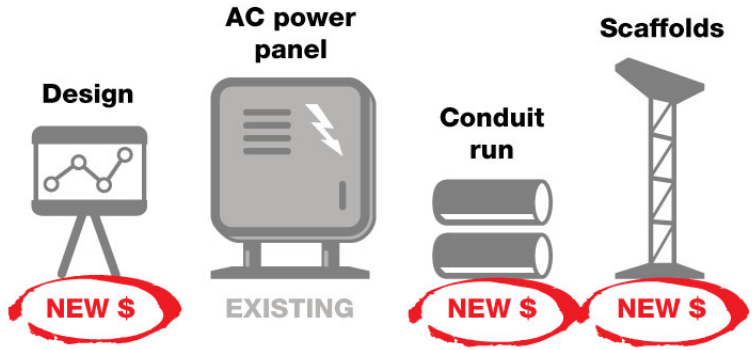
EXAMPLE 1:

Simple installation with AC power within 150 feet of new meter:

- **$4,000** = Design at $100 per hour with 1 week billing for drawings, material list, IFC package
- **$6,000** = Existing AC power panel with easy conduit run / material and labor
- **$7,000 per scaffold** = if you have scaffolds above 20 feet ($4,000 each if below 20 feet)

TOTAL you could save on AC by using 2-wire instead of the above:

$17,000



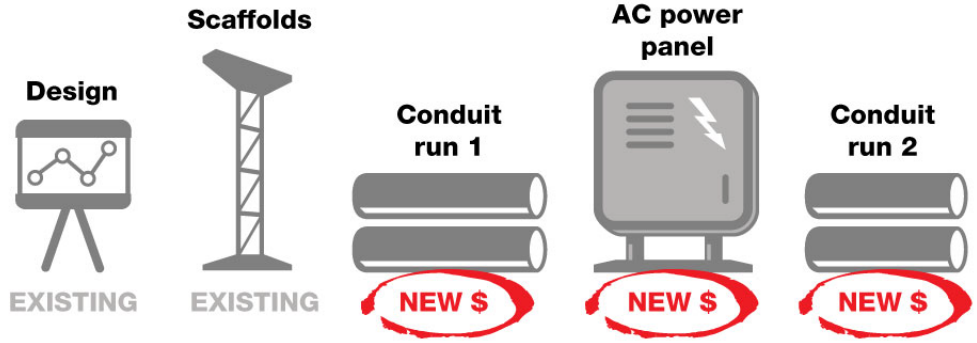
EXAMPLE 2:

AC Power Panel 500 feet away (design and scaffold stay the same):

- **$18,000** = Conduit run / material / labor
- **$23,100** = New AC Power Panel (using line items shown below)
  - Design around 4 weeks for complete construction package = $16K;
  - Transformer = $2.5K;
  - 36 breaker power panel = $4.6K
- **$10,000** = Conduit run from a substation to new panel location (using line items shown below)
  - $5K per 100 feet
  - Assumption of 200 feet

TOTAL you could save on AC by using 2-wire instead of the above:

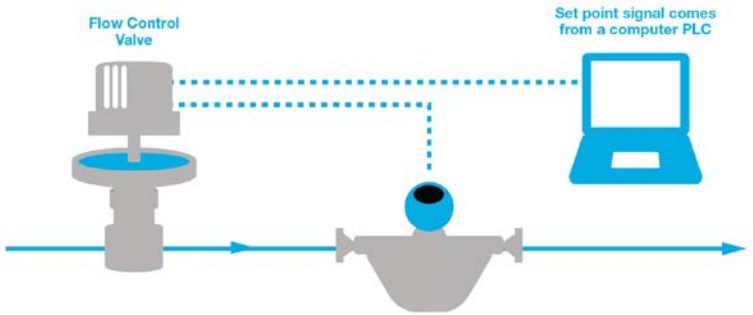
$51,100



Chemical injection – Installation Experience

CHALLENGES

- Intensive maintenance required
- Inaccurate flow measurement
- Variability of chemical with conditions
- Poor reliability of pumps or control valves
- The installation of flow meters in suction side not provide reliable amount of fluid being injected (Potential Pump leak)
- Safe operation in High pressure application

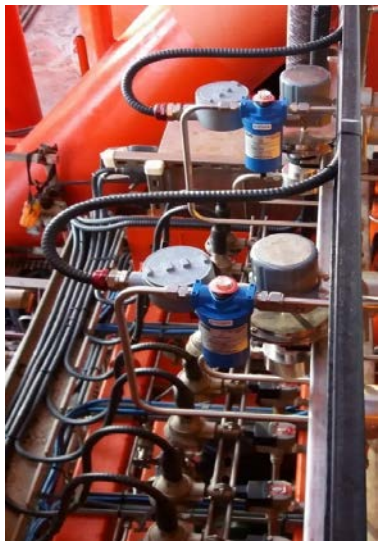


Operator Success

SOLUTION

Micro Motion and Tescom combined solution

- Improve accuracy from ± 1.0 Gallon per day to ± 0.1 gallon per day
- No plugging due to seals or gaskets
- Safer Operations
- Online Density for chemical variance



OPERATIONAL IMPROVEMENTS

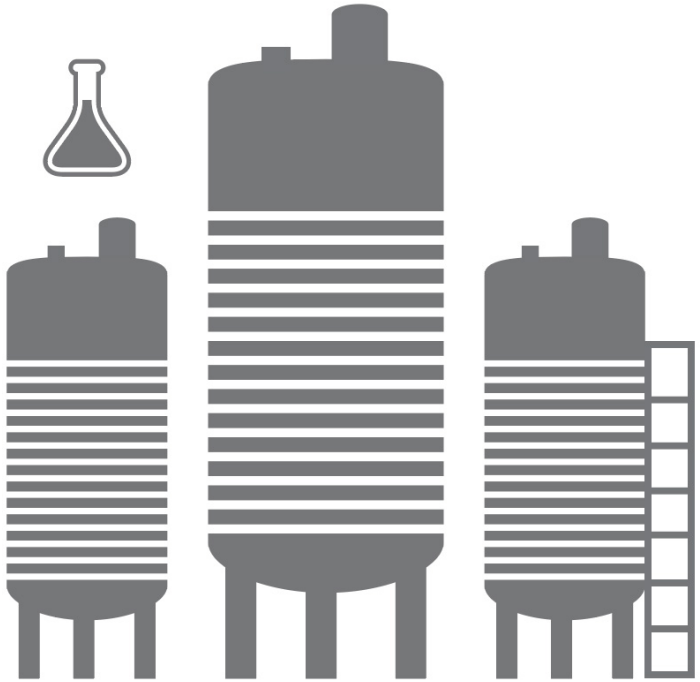
Chemical injection program automation

- Improve dosing reliability
- Improve uptime
- Reduce maintenance

BUSINESS RESULTS

$300k / year chemical cost reduction on each platform

Inhibitor Injection for Reactors



CHALLENGE

Usually dosed using rotameters due to low flow rates.

Cost of material is high and over/under dosing can cause batch accuracy problems and delayed reactions.

2-WIRE SOLUTION

Use existing wires to replace the rotameter. The Coriolis meter now has better range and accuracy compared to the rotameter.

BENEFIT

Improve batch throughput and optimize reaction time means higher yields and profitability.

Natural Gas Distribution In Plant

CHALLENGE

Uncompensated DP and other flow technology's rangeability.

Improper allocation of costs usually by assumptions versus actual flow devices measurement.

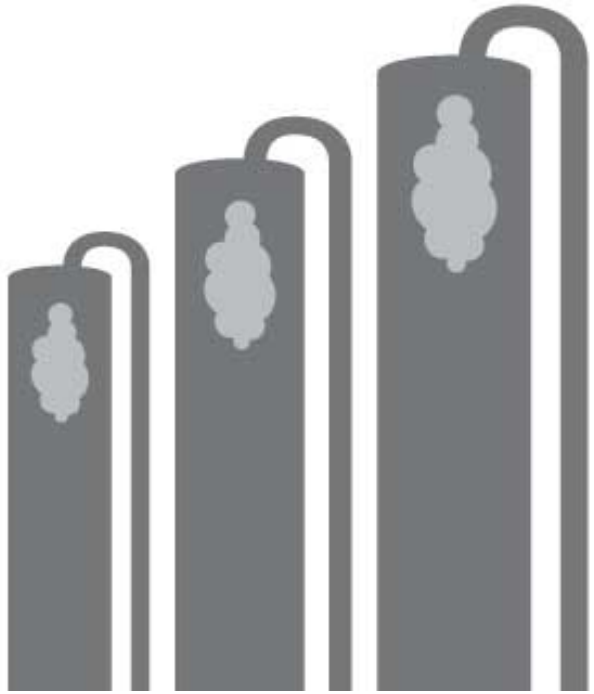
2-WIRE SOLUTION

Ease of retrofitting if DP or other legacy 2-wire technology is being used to measure natural gas.

BENEFIT

Proper allocation of costs to each operating unit and better natural gas usage balance in plant.

Hydrogen Gas



CHALLENGE

DP flow measurement does not have rangeability or accuracy for lower flowrates.

Not able to accurately account for the amount of hydrogen which impacts production.

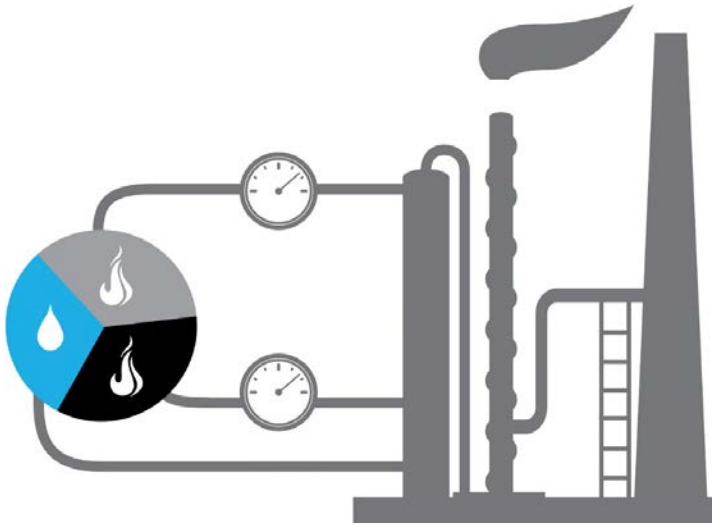
2-WIRE SOLUTION

Plant did not have to run additional power wiring and therefore it was a simple replacement of the DP flow meter. The benefits of the Coriolis meter provides a reliable and accurate hydrogen flow measurement.

BENEFIT

Accurate accountability of hydrogen in the plant resulting in better production.

Allocation Meters for Process Gas



CHALLENGE

Installation costs prohibitive to run power where every measurement is needed

Inability to properly allocate costs and measure gasses for efficiency and less waste.

2-WIRE SOLUTION

Ease of installation and engineering. Immediate ability to see where gasses are going in the plant and how much is being used.

BENEFIT

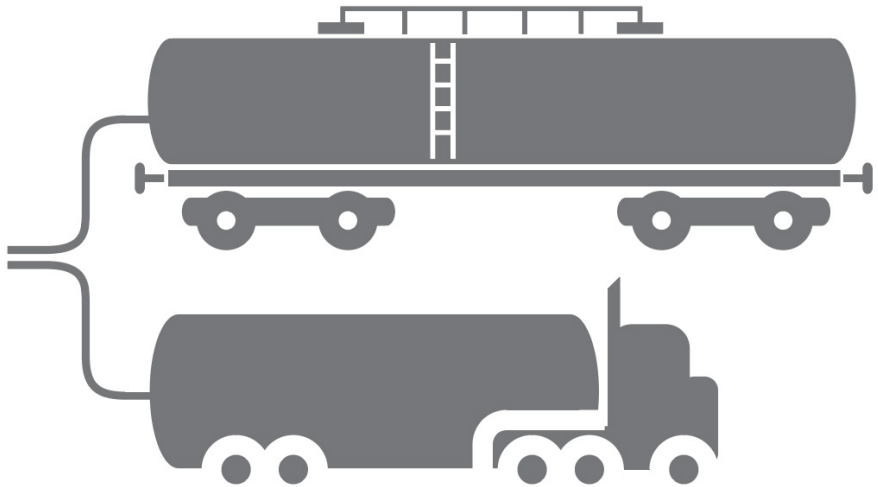
Ability to see high usage applications to optimize the process.

Railcar and Tank Truck Loading

CHALLENGE

Use of traditional technologies does not account for changing volumes due to pressure and temperature changes.

Possible overfill, over charge for product and under fill tank or railcar.



2-WIRE SOLUTION

Ease of retrofitting PD and turbine meters typically used on loading racks reusing the same pair of wires. Coriolis measuring by mass will not be affected by changing pressure and temperature.

BENEFIT

More accurate fills, fill vessel closer to boiler plate specifications results in less rail cars under filled, less exposure due to overfill, and bill for every drop.

Model 4200 – the 2-wire Coriolis transmitter

Compatible Sensors	Sensors upto 4” size
Smart Meter Verification	•SMV Basic and Zero Verification are included as standard •SMV Professional is available as a licensable option to print the SMV report •Coating detection, Multiphase, and Flow Range features are not available •Flow must be stopped due to low power restriction
Display	•Backlit LOI or Blind •LOI screen can rotate via software selection •Capacitive Touch Buttons •Fully configurable through display
Data Historian	•2 days at 10 seconds scan rate •14 days at 5 minutes scan rate •Complete Audit Trail and Alert Log
Real Time Clock	Time stamps SMV reports, process data, and audit trail
Wireless	Compatible with Smart Wireless THUM Adapter
SIL Capability	SIL 2 capable for single use SIL 3 capable for multiple use
Power Requirement	4-20mA 17.75V liftoff w/ +1V for backlight
Available Channels	Channel A: Loop powered 4-20mA/HART Channel B: Licensed, 4-20mA/FO/DO (passive)

Approvals	CSA Class 1, Div 1 Ex Proof or Intrinsically Safe CSA Class 1, Div 2 ATEX and IECEx are also available
Application Restrictions	Continuous Multiphase Density/Viscosity Limit: 1.4 g/cc / 500 centipoise High Velocity Gas Limit: 0.2 Mach

THANK YOU