



TruProof™ **miCRO³**

Accuracy Through Time Correlation Technology

- **Eliminates errors associated with manufactured pulse technologies produced by signal delay**
 - **Delivers enhanced performance resulting in reduced bias & improved repeatability**
- **A combination of microcomputer & time correlation software to sync a meter output signal with comparative prover volume captured during meter proving.**
- **Provides a seamless addition of time correlation technology to existing systems**

Backed by 10 years of advanced design and research.

PROVING OPERATIONS

Consistent improvement in proving results reduces bias and insures that you can have greater confidence in the measurement regardless of meter technology in use. Meters producing a manufactured pulse output representative of flow inherently produce a signal that is delayed from the actual measurement event (See *API MPMS Chapter 4.8* and "*API's Microprocessor Based Flowmeter Testing Programme*", *Omni Flow Computers Inc., International School for Hydrocarbon Measurement (ISHM), University of Oklahoma, 2005*) that produce timing bias errors which TruProof will correct.

Operating measurement systems implemented with inaccurate or biased meter factor adjustments can, and do, lead to material imbalances. The resulting necessity to identify and correct these errors is time consuming, costly, and adverse to business integrity.

TruProof works by correlating the measurement cycle and resulting change in meter output frequency with the associated prover gate circuitry to produce synchronization of the compared volumes in order to get a more accurate, repeatable and reproducible proof, time after time. Manufactured under U.S. Patents 7,395,690 and 7,373,798 B2 (others applied for), TruProof is the most advanced dual chronometric, pulse interpolation proving technique in the world today.

Details of every prove will be recorded in the TruProof Micro³ microcomputer, and transferred to associated systems, such as, Flow-Cal's PROVEit[®] proving software platform. Utilizing the combined strength of TruProof/PROVEit[®], virtually any prover can be modernized to current standards technology levels.

PULSE DELAY

Pulse delay results from meter program execution delays (latency), signal filtering, and user imposed damping. Of these, only the damping delay is within the control of the user. As a result all meters producing manufactured pulses exhibit signal delay irrespective of the magnitude of user imposed signal damping. Damping serves to potentially increased expressed signal delay depending on operating conditions. Any signal delay produces timing bias in the meter factor to some degree. TruProof eliminates the timing bias. Ultimately, the goal is produce a meter factor that is without timing induced bias. Simply stated; A meter correction factor that produces a representation of volume or mass that agrees perfectly with that of a comparative Prover.

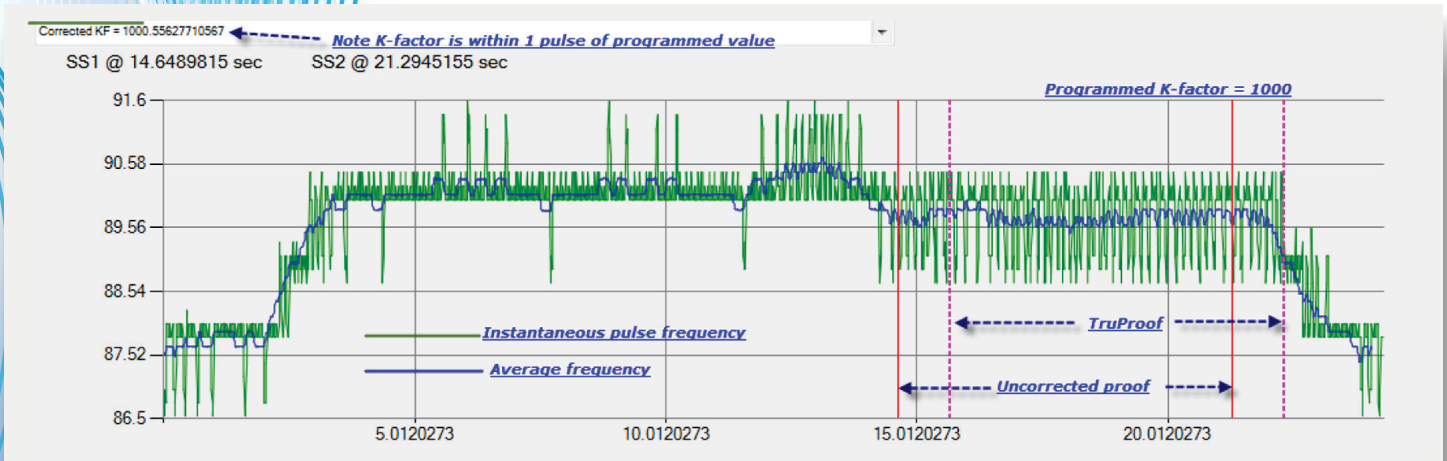


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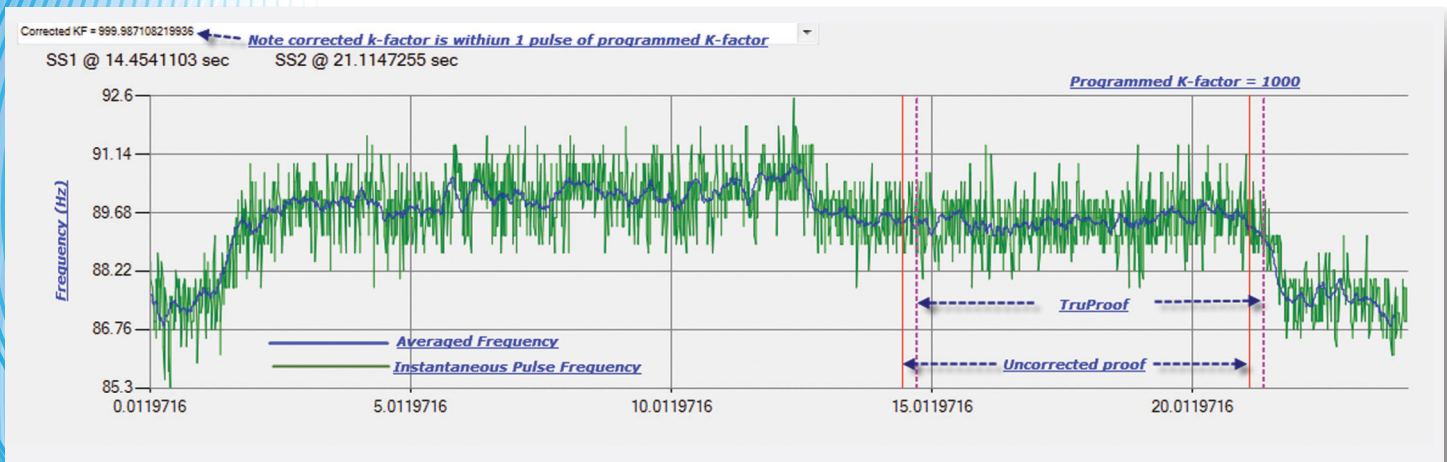
PERFORMANCE COMPARISON

(with and without pulse delay)

Meter with factory programmed signal damping



No signal damping applied



Robust, Rugged, Reliable, Repeatable & Predicable

TruProof[™]
miCRO³[™]



- Rugged and reliable electronics. Power in, power out and every field I/O point individually Galvanically isolated.
- Rock Solid measurement and software stability. Unique Software Science employed to ensure predicable operation.
- Interfaces with industry standard flow meters
- Small footprint
- Very simple to set-up
- Dual 10/100 MHz Ethernet ports provided as standard for redundant communications
- Integrated web server allows local or remote operation and configuration
- Can be operated as single streams
- Designed for a minimum 25 year operational life
- Lower Power product saves over 1 ton of CO2 over the product life
- RoHS and WEEE Compliant

So what is it?

The **TruProof Micro**³ has been designed in a holistic manner to be a synergistic system component, rather than an "island of data". Close integration with host systems (**PROVEit**[®]) insures maximum integration values are obtained.

Communications and connectivity are at the core of the design. Access to data and reports locally and remotely are catered for easily using Internet Protocols (HTTP for browsing and XML for data retrieval). In addition legacy systems are supported with both Modbus serial and Modbus TCP.

For simpler applications, much of the configuration can be done using the embedded web server, giving an optimum balance of simplicity and flexibility. When combined with **PROVEit**[®], configuration is managed entirely from **PROVEit**[®] with the embedded web browser an added benefit.

As a result, the total cost of ownership will be reduced as much as possible to the Oil and Gas companies, operators, integrators and auditors.

CONNECTIVITY

Communications

- Two full featured and independent 10/100 MHz Ethernet controllers with dual link status indication
- Three Serial ports

Digital Field I/O

- Isolated Dual Pulse meter inputs support true Level A, B or E operation modes up to 10KHz with line integrity checks
- Dual Density meter input circuits measure periods to nanosecond resolution and are also isolated
- Nine individually isolated Digital Inputs can be used as general purpose inputs (with fleeting change detection) or Sphere Switch detectors.
- Eight individually isolated Digital Outputs can drive relays or be used as General Purpose outputs. Two outputs can also be configured to produce pulse outputs

Meter Provers

The **TruProof Micro³** can interface with conventional 2 or 4 switch bi-directional Provers as well as uni-directional variants. Flow Management Devices small volume Provers equipped with **TruProof Micro³** provides TruProof as a standard feature and the only OEM offering its advantages. In addition, Brooks, Calibron can be upgraded with TruProof via Coastal Flow Measurement's integrated **PROVEit[®]** proving software platform.

HARDWARE SPECIFICATIONS

Physical

Mass: 485 Grams excluding mating connectors
Size: 170mm by 130mm by 70mm high
Mounting: Needs 170mm length of top-hat DIN Rail to EN50022

Power

Supply Voltage: 12 to 28 VDC, 5 Watts Typical
Redundancy supplies: Two independent power connectors to allow dual redundant supplies
Isolation: Supply is Galvanically isolated from computer ground
Backup Supply batteries: Use of FRAM allows 30 year archive storage without batteries

Field I/O Specifications

Digital Inputs: Opto-Isolated inputs, with filtering and fast sampling Digital Inputs can be used as Sphere Detectors, with Dual Chronometry

Environmental

Operating Temperature: -40°F to +185°F, Non-Condensing
Storage Temperature: -58°F to +195°F

Transaction Capacity

CPU arrangement System CPU: Two CPUs are used, an 80 MIPS I/O processor and the System CPU
System CPU Type: Advanced RISC Processor, 720MHz ARM Cortex-A8
Volatile Memory: 256MBytes DDR3
Program Memory: 128MBytes NOR Flash, 128KBytes FRAM
Archive Store: 8MBytes NOR Flash with SD/SDHC slot for 32GByte removable storage

Communications

Ethernet: 2 off 10/100 MHz Ethernet ports supporting IP protocols



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