FISCAL METERING SYSTEM DESIGN

- some design evaluations with respect to lifecycle cost/benefit

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We put you first.
And keep you ahead.

Design Categories

Case: Liquid Metering Station

- Design
  - Conventional liquid metering station with volume prover
  - Liquid metering station with master meter and portable prover connections
  - Liquid metering station with master meter (no inline proving)
  - Multi-phase metering
- Configuration
  - Serial configuration
  - Parallel configuration
  - Z-configuration

Evaluation Criterias

- Price and delivery time (project phase)
  - Cost of parts, engineering, complexity
- Accuracy
  - Conformance to fiscal accuracy requirements
- Functionality
  - Flow range, online maintenance, online calibration, online diagnostics
- Reliability / Maintenance cost
  - Maintenance and diagnostics facilities, complexity, maintenance intervals, knowledge for maintenance

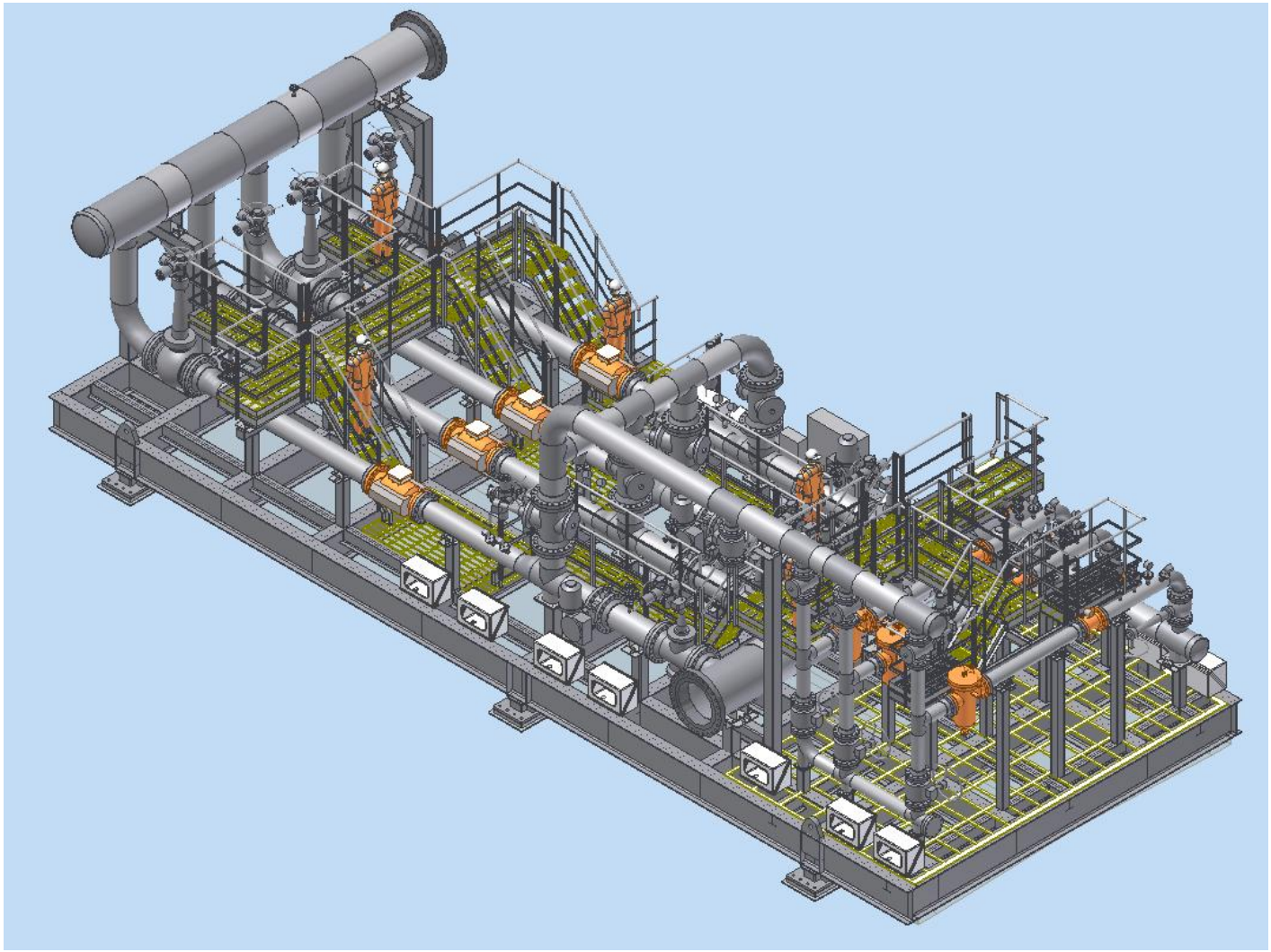
Evaluation – Design Categories

+ Advantage
- Disadvantage

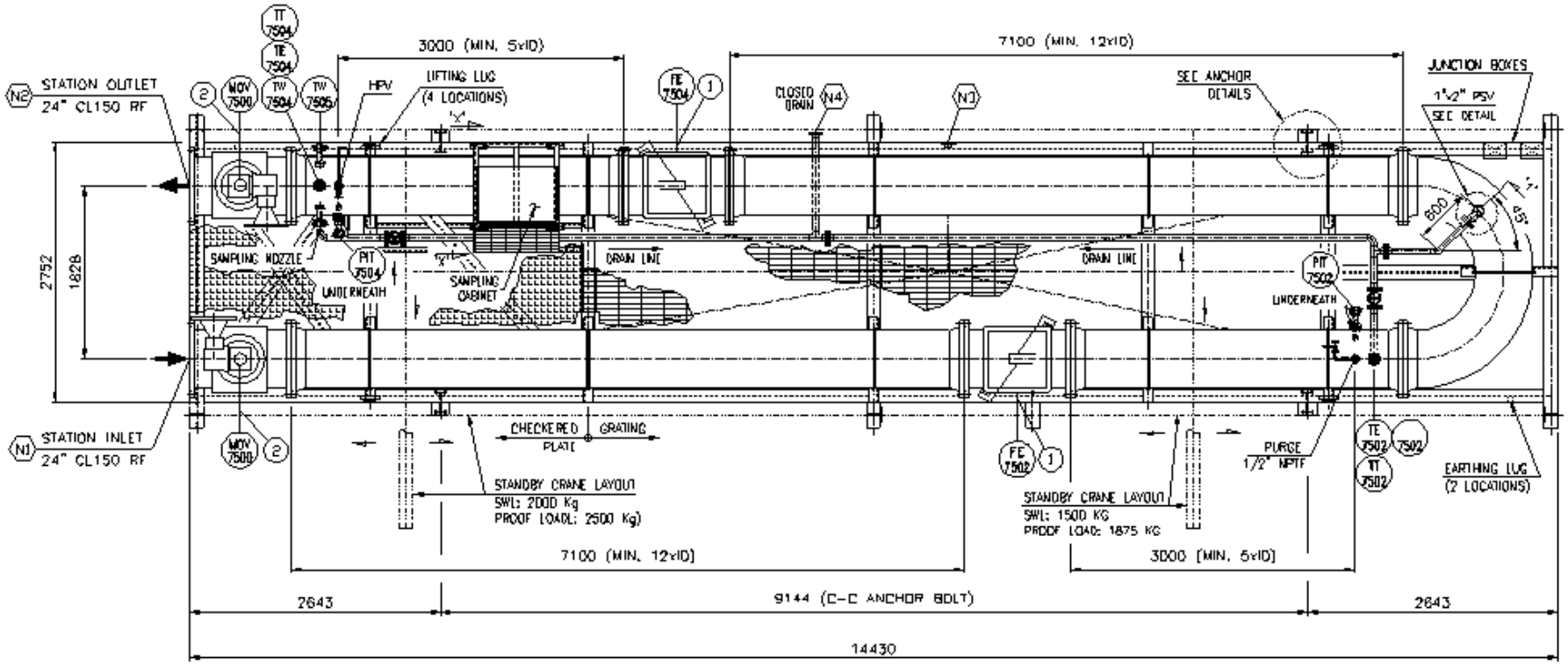
	Price and delivery time	Accuracy	Functionality	Reliability / Maintenance	Sum
Conventional with volume prover	-	+	+	-	0
Master meter and portable prover connections	0	0	+	+	++
Inline meters only	+	-	-	-	--
Multi-phase metering	+	-	0	-	-

Liquid Metering Station with Prover

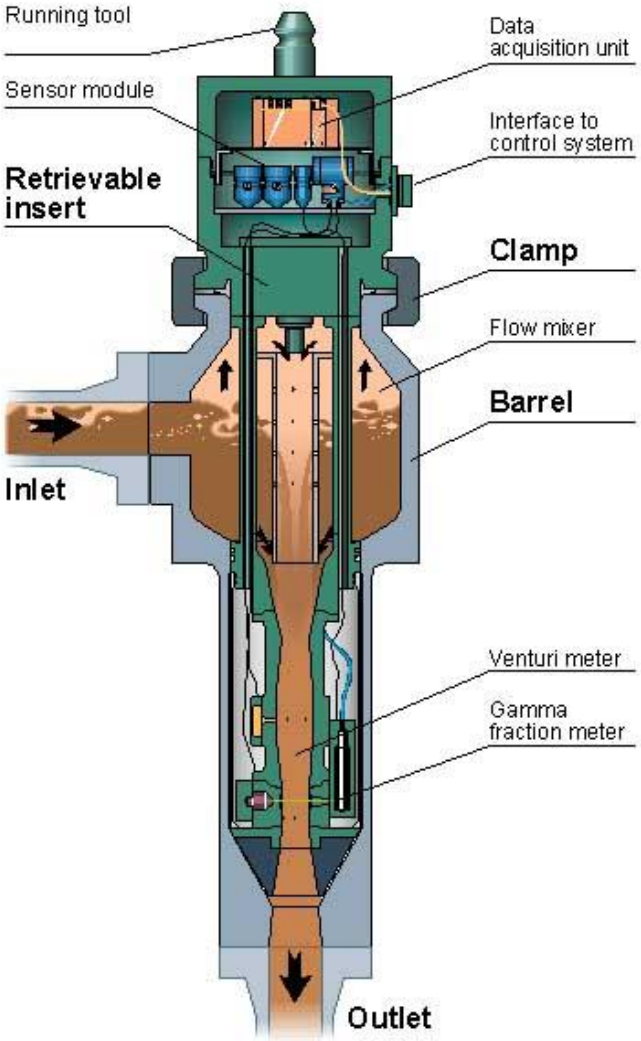
Liquid Metering Station with Master Meters



Liquid USM Metering Station
- no master meter or proving facility



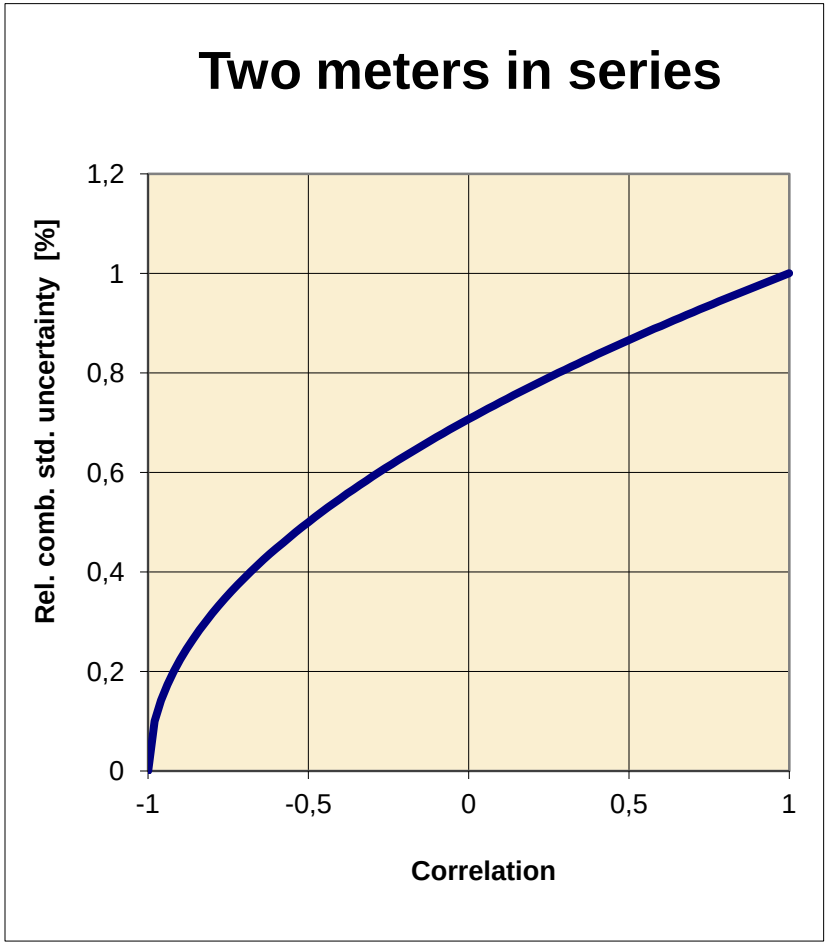
Multiphase Metering

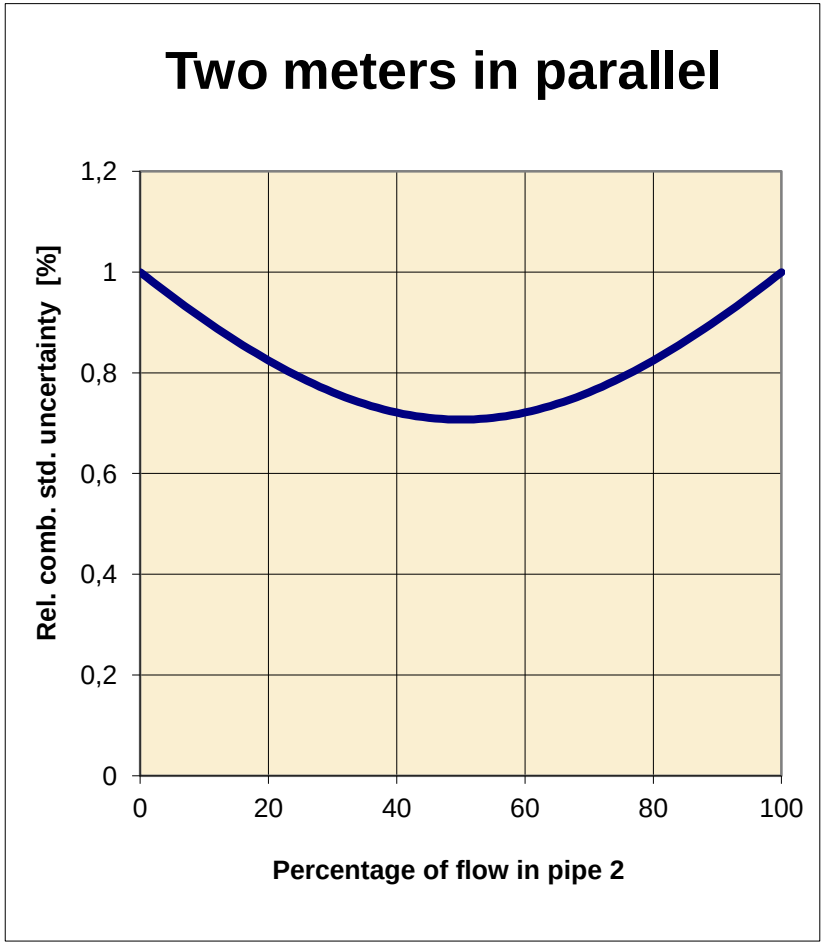


Evaluation – Design Configuration

	Price and delivery time	Accuracy	Functionality	Reliability / Maintenance	Sum
Serial configuration	+	+	+	-	++
Parallel configuration	0	+	0	0	+
Z-configuration	-	+	+	+	++

Serial vs. Parallel Configuration





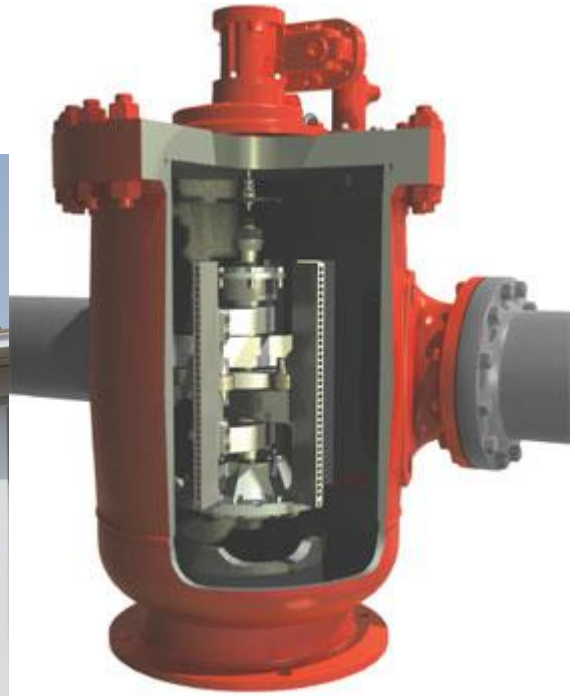
Flow Measurement Technologies

- Liquid
  - PD (Positive Displacement) Meters
  - Turbine Meters
  - Ultrasonic Meters
  - Coriolis Meters
- Gas
  - DP Meters (Orifice, Venturi)
  - Cone Meters
  - Ultrasonic
  - Coriolis

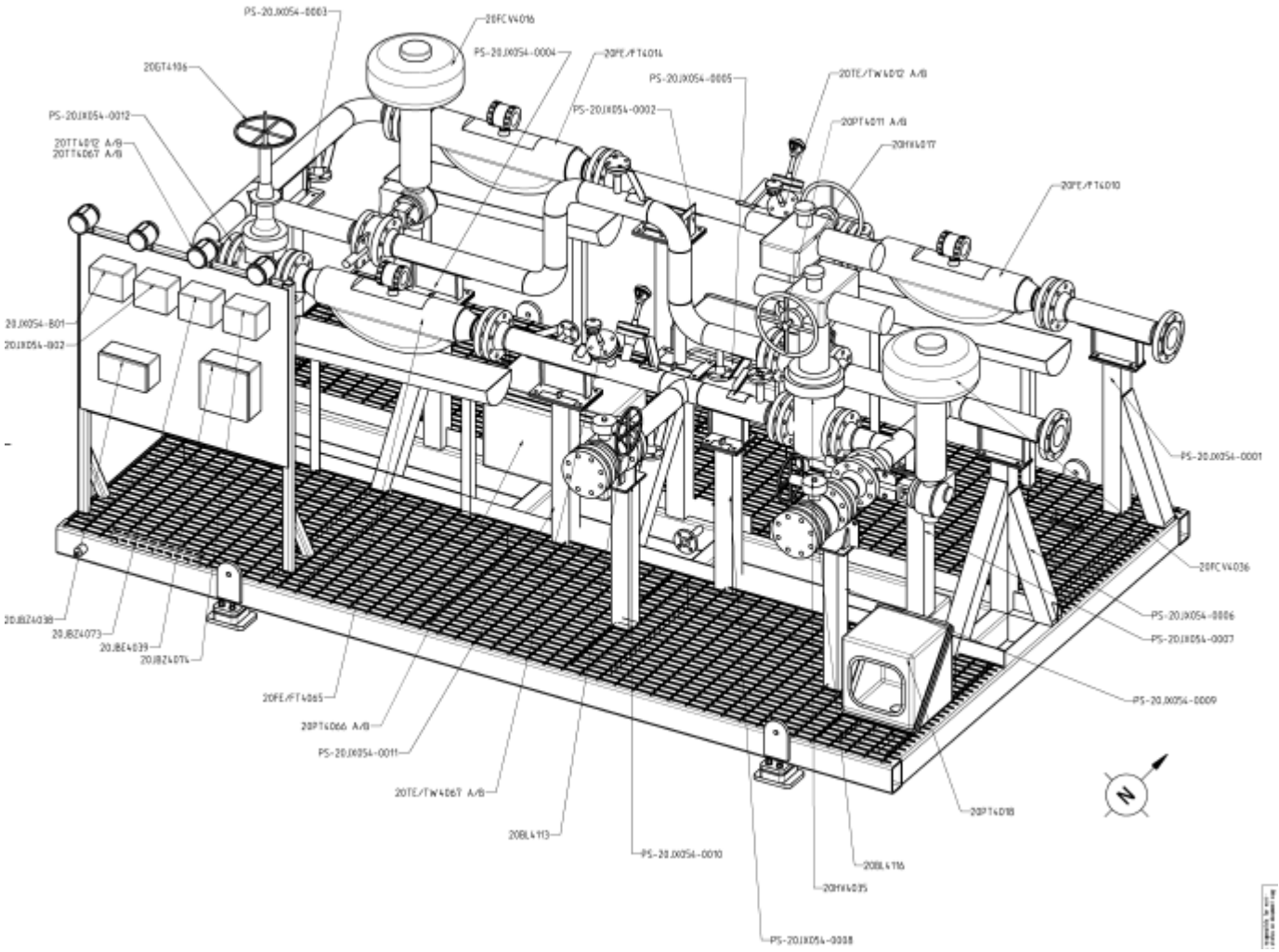
Evaluation – Flow Measurement Technologies - Liquid

	Price and delivery time	Accuracy	Functionality	Reliability / Maintenance	Sum
Liquid PD	-	+	0	0	0
Liquid Turbine	0	+	0	+	++
Liquid Ultrasonic	0	0	+	0	+
Liquid Coriolis	+	0	+	+	+++

PD Metering Station



Coriolis Metering Station



Evaluation – Flow Measurement Technologies - Gas

	Price and delivery time	Accuracy	Functionality	Reliability / Maintenance	Sum
Gas DP	0	-	-	+	-
Gas Cone	+	-	-	+	0
Gas Ultrasonic	0	+	+	-	+
Gas Coriolis	+	0	+	0	+

Gas Metering Stations

Important Issues in the Project Phase

- Metering knowledge at Operator / Contractor
- Calibration arrangement (provers, master meters)
- Proven technology
- Combine measurement techniques
- Quality (fluid property) measurements

Preferred solution:

- **Solid technical design based on proven technology including inline calibration/verification arrangement**