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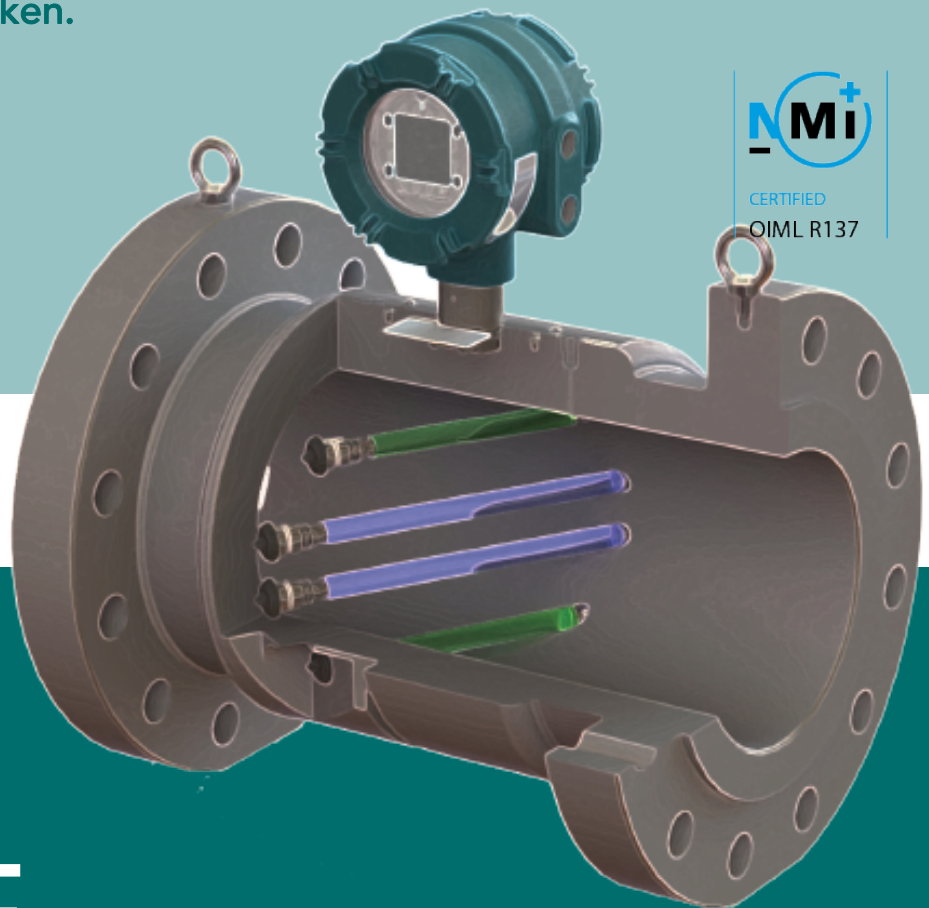
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## UIM Series Flowmeter

## UIM-4F for Custody Transfer Measurement Four Paths for Enhanced Accuracy and Reliability

The UIM-4F has four paths as standard. It has been tested to meet the international standards for custody transfer metering including AGA-9 and OIML R137 (class 0.5). Integration of the flow across the paths provides accurate measurement even with varying flow profiles caused by changes in flow velocity, gas composition and pressure or upstream pipe configuration. Fast response is maintained by the simultaneous transmission on more than one path using Broadband Continuous Wave processing. The measured flow profile provides a diagnostic tool. Should one path fail, the Path Substitution Algorithm uses historical flow data to continue reliable flow measurements until the path recovers or remedial action is taken.



# UIM-4F

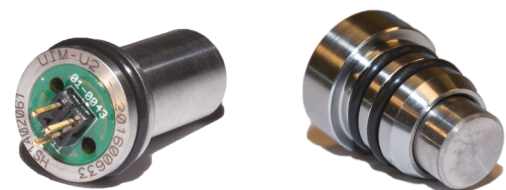
## Features



- Highly accurate four path custody transfer flowmeter.
- OIML R137-1&2 (class 0.5) certified.
- AGA-9 compliant.
- MID 2014/32/EU approved.
- Available in sizes from 3" and larger and flange ratings up to 900#.
- Patented Broadband Continuous Wave technology.
- Extremely low power operation.
- Simultaneous transmission on two or more paths means very fast response.
- Fully Intrinsically safe.
- Extensive diagnostic information using TIMCare™ software.
- Rugged, highly efficient all metal transducers.
- Extensive range of versatile I/O including optional pressure and temperature sensors for PTZ compensation.
- Retraction tool available for removal and replacement of transducers under pressure.

## Benefits

- The combination of cutting edge electronic processing and rugged and powerful transducers and international certifications result in the optimum solution for custody transfer gas measurement conditions.
- Simultaneous transmission and fast response provide reliability and accuracy in the most challenging flow regimes and pulsating flow conditions.
- TIM® (Transus Instrument Manager) software provides extensive diagnostic information to determine the "health" of the flow system, including blockages, build up and up-stream disturbances.
- On-board diagnostics and flow readings may also be accessed using the LCD and key pad.
- Complete intrinsic safety means there are no restrictions accessing the display/keypad even in hazardous areas.
- Full Intrinsic safety also reduces wiring costs and installation costs and greatly simplifies field maintenance.



## Titanium Transducers - Rugged and Efficient

The very efficient design of the ultrasonic transducers allows them to operate at the very low transmitting voltage of 3.6V compared to tens or even hundreds of volts required by other manufacturers. All wetted surfaces are metal for the harshest conditions. The optionally retractable UIM Series Transducers are suitable for pressures up to 153 bar (2250psi).

# UIM-3 and UIM-3F for Precise and Reliable Flow Measurement in Harsh Environments

Today there is an increasing need to monitor emissions and improve energy efficiency in order to meet new environmental and economic challenges. These gases are usually dirty and wet and they can contain corrosive gases and liquids. Until now, there have been no suitable flowmeters for many of these applications. The new UIM-3/3F ultrasonic flowmeters use patented Broadband Continuous Wave® signal processing and high efficiency titanium transducers to provide reliable and precise flow measurement even in the most extreme applications.

## Features

- Highly accurate path ultrasonic flow meter, available in fiscal (UIM-3F) and non-fiscal (UIM-3) versions.
- AGA-9 compliant (UIM-3F).
- Available in sizes from 2" to 16" and flange ratings up to 150, 300 and 600#.
- Patented Broadband Continuous Wave technology.
- Low power operation.
- Simultaneous transmission on two or more paths.
- Fully Intrinsically safe.
- Local graphic display and keypad.
- Rugged, highly efficient all metal transducers.
- Extensive range of versatile I/O including optional pressure and temperature sensors, digital and analog (4-20mA) outputs and RS485 Modbus communications.
- Retraction tool available for removal and replacement of transducers under pressure.

## Benefits

- The UIM-3 provides a reliable and accurate 3-path gas flow measurement at the price of most single path meters.
- The UIM-3F is an economical solution for fiscal measurement where the very high accuracy of UIM-4F is not required.
- On-board pressure and temperature sensors allow an integrated solution for PTZ calculation, volume conversion, molecular weight calculations for flare gas or methane concentration biogas. Consult factory about your application.
- Flow readings and extensive diagnostics information may be accessed using the local LCD graphics display and keypad or TIM® software to provide constant monitoring of the "health" of the flow system.
- Full Intrinsic safety also reduces wiring costs and installation costs and greatly simplifies field maintenance. Display/keypad and field wiring may be accessed in hazardous areas without special precautions.

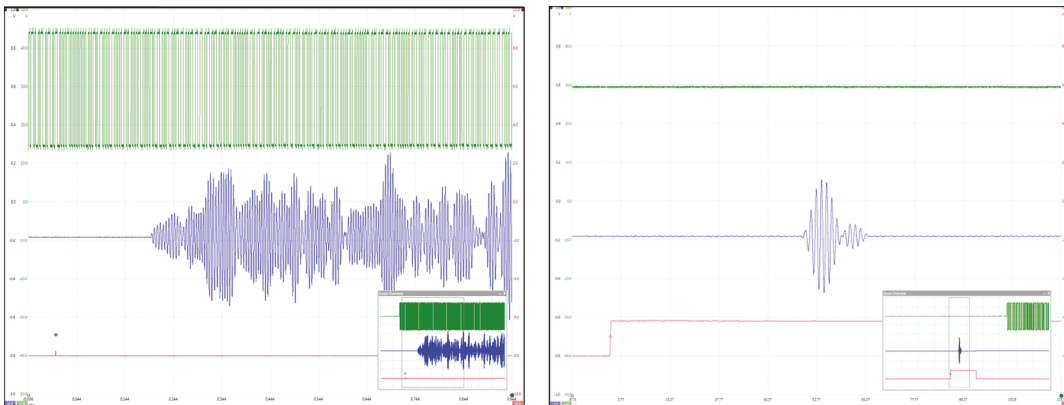
# UIM-3/3F



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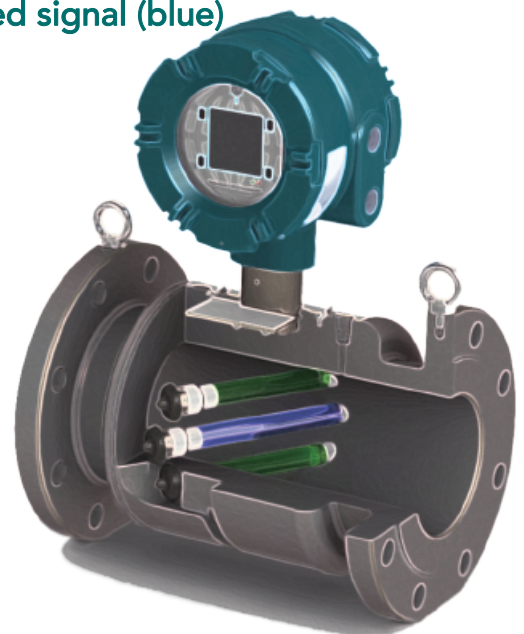
## Broadband Continuous Wave Signal Processing

Most ultrasonic flowmeters transmit a short burst of ultrasonic energy consisting of between one and four pulses or cycles. A few ultrasonic meters use a short code, typically much less than 100 cycles. The UIM ultrasonic flowmeter transmits many thousands of cycles in an almost continuous stream of encoded pulses. At the receiver, the signal is decoded in real time to reconstruct the receive signal that is precise and resistant to signal noise and interference in difficult applications. Extending the transmitted power over a long period rather than a few short pulses means that much lower transmit voltages are used, resulting in safety and low power. In addition, other ultrasonic flowmeters can only transmit on one acoustic path at a time. The Broadband Continuous Wave system, using codes that do not interfere, can transmit on two or more paths simultaneously. Simultaneous transmission means a faster response time and better performance in fluctuating or pulsating flow.



Left: Encoded Transmitted Signal (green) and received signal (blue)  
 Right: Decoded receive signal (blue)

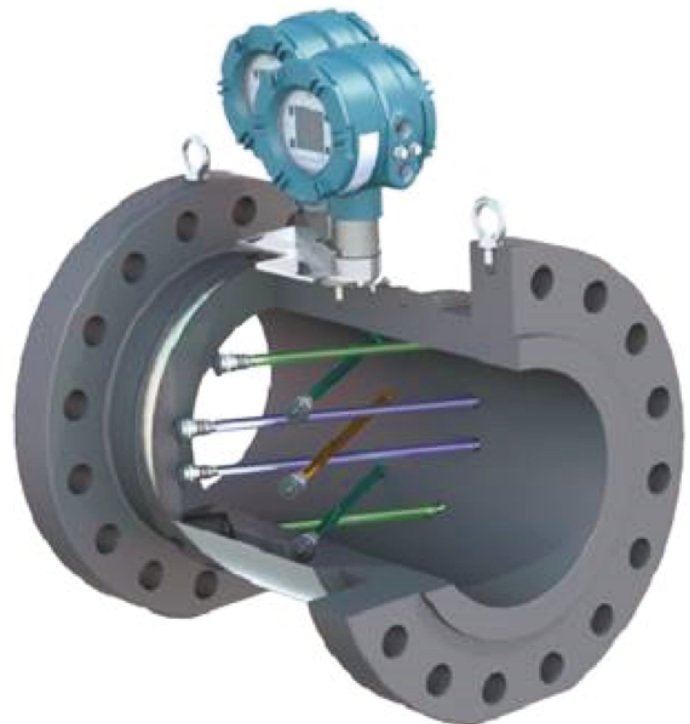
# Broadband Continuous Wave

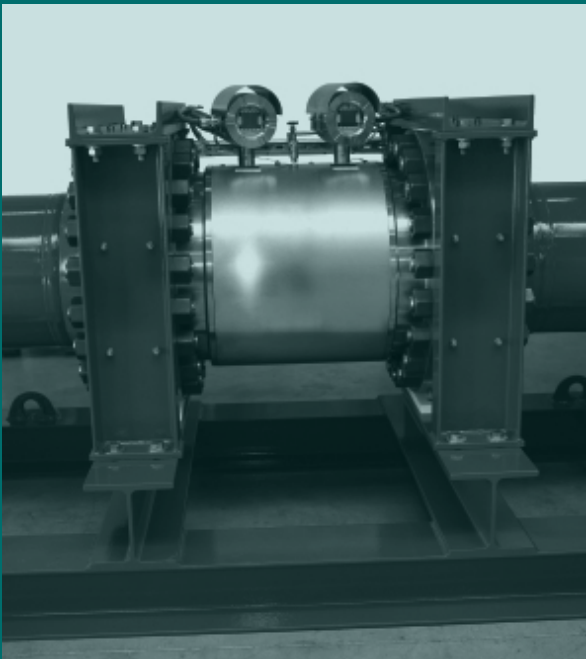


## UIM-4F Duo for Custody Transfer Measurement with Enhanced Condition-based Maintenance Capabilities

The UIM-4F Duo consists of two fully independent systems. The main measurement is done by the UIM-4F four path part. The three path system provides a secondary measurement and uses enhanced diagnostics to enable the user to perform condition-based maintenance. In addition, the UIM-4F Duo provides a wealth of information on the condition of the complete metering system. Traditional setups utilise a secondary measurement with single or dual paths, usually resulting in an overly sensitive system causing false indications of potential application problems such as fouling, flow conditioner blockages etc. By using a three path secondary measurement, which is less sensitive to slight profile changes, the UIM-4F Duo provides the diagnostics needed to detect potential issues. The UIM-4F Duo path layouts are significantly different as the paths are oriented at different chord locations. Therefore, common mode errors are not present as both meters respond differently to profile changes.

# UIM-4F Duo





## Features

- Two independent accurate fiscal flow measurements in a single flowmeter body.
- Primary flow measurement uses the highly accurate UIM-4F four path chordal configuration, meeting AGA-9 and OIML R137 (class 0.5) international standards for custody transfer metering.
- Secondary flow measurement uses the UIM-3F three path chordal configuration, also highly accurate, and meeting AGA-9.
- Available in sizes from 8" and larger and flange ratings up to 900#.
- Each meter has the full range of versatile I/O of the UIM-4F and UIM-3F flowmeters, including optional pressure and temperature sensors for PTZ compensation.
- Extensive diagnostic information using TIMCare™ software.

## Benefits

- Highly accurate fiscal flow measurement with continuous verification by the secondary measurement.
- An economical solution where a redundant measurement is required for monitoring and verification.
- A space saving compact package compared to installing a second meter for verification. Smaller skid sizes and lower installation costs.
- The four path primary measurement and three path secondary measurement ensure that common problems are detected. Two identical path configurations can miss common mode issues such as pipe blockage.
- Two fiscal measurements ensure that false alarms are avoided, as is often a problem when using sensitive one or two path secondary measurements.

# Condition monitoring

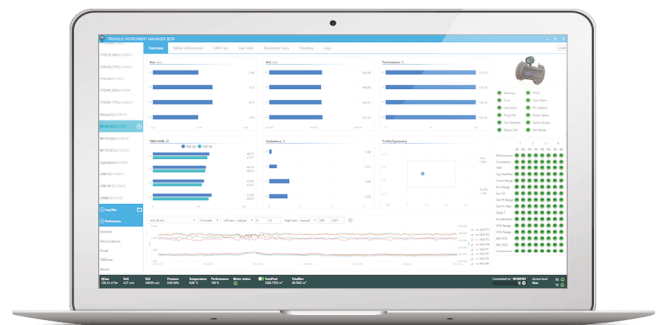
The UIM Series flowmeters provide extensive diagnostic information both on the graphic display screen and remotely via the Transus Instrument Manager TIMCare™ PC interface. Flow information and diagnostics may be logged over time to show trending and enabling real time condition monitoring.

## Meter Performance

The velocity profile is a function of the upstream pipework. By calculating velocity ratios between the ultrasonic paths, a good indication of the flow profile is realized. The flow meter calculates Profile and Symmetry Factors which can be used for condition monitoring of the measurement and the gas flow. In addition, the UIM Series flowmeter provides diagnostics for turbulence by means of the standard deviation of the instantaneous path velocity measurements. The standard deviation provides an excellent diagnostic for turbulence, fluctuations and may serve as an indicator of upstream disturbances. Additional meter diagnostics such as velocity of sound, signal-to-noise ratio and signal strength are available to the user as well.

## Status Indicators

Indicator lights, or “traffic lights”, provide a very quick indication of a warning (yellow) or error condition (red) at the system and individual path level.



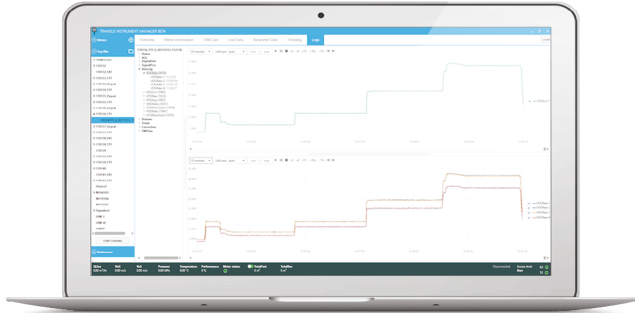
## TIMCare™ Advanced Condition Monitoring

Using TIMCare™, the condition of the UIM Series flowmeter may be monitored over the long term. TIMCare™ allows the user to compare the meter’s diagnostics against known conditions such as its initial calibration, first gas and recalibration. TIMCare™ will automatically validate key diagnostics against reference cases. An intuitive on screen report is generated, allowing the user to observe changes in the meter’s condition over time. Changes that are usually not discernible when taking a diagnostic snapshot are easily detected. TIMCare™ greatly assists in reducing uncertainty caused by variables over time, such as dirt build up on the bottom of the piping and/or fouling of the transducers and pipe wall. When diagnostic readings remain consistent over time, it may be assumed the meter is performing within specifications and recalibration intervals may be extended.



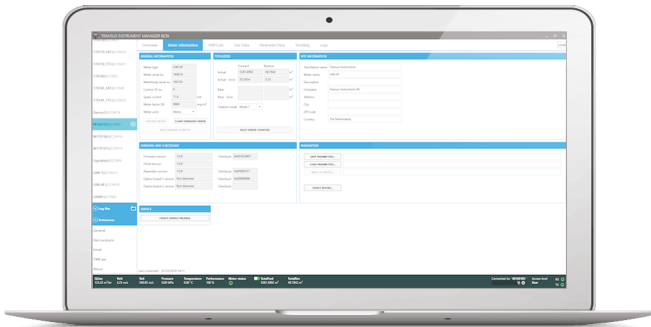
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## Meter Information

The Meter Information screen displays an overview of the meter's programmed parameters, such as the units, pipe size and ultrasonic path configuration, as well as specific customer site information. Important traceability information including firmware versions, checksums and serial numbers are also displayed. Reports may be generated and, depending on the user's level of authority, certain programming functions may be implemented.



## Data logging and Trending

User selectable flow data or diagnostics may be logged and displayed graphically. Historical trending of data may provide an early indication of a potential problem or maintenance requirement. For example, a gradual drop in gain (AGC) on an ultrasonic path may indicate fouling in a transducer port, or a large change in profile may indicate fouling of an upstream flow conditioner.



## Diagnostics

At the heart of the ultrasonic flowmeter are the measurements of the ultrasonic transit time and ancillary measurements from pressure and temperature sensors. The Diagnostics screen allows service personnel or experienced users to check the operation of these sensors and quickly anticipate or diagnose problems. The ultrasonic signals and detection points are displayed in "oscilloscope mode" for rapid troubleshooting and may be saved for off-site analysis or as a baseline. In the event of an error or warning indication, or if the operator wishes to log a baseline, a Service Package may be generated. The Service Package contains device configuration data, log files and signal data. The data will be zipped and can then be emailed to our experts for further analysis.

# A new frontier in Ultrasonic Flowmeter Technology

The unique combination of cutting-edge signal processing and superior acoustics delivers the solution for your most demanding flowmetering applications in an economical and compact package.

## Difficult Applications

The titanium ultrasonic sensors are remarkably efficient and coupled with the Broadband Continuous Wave processing can reliably measure the most challenging applications such as wet and dirty gases, varying gas compositions and attenuating gases. The combination of the efficient transducers and the Broadband Continuous Wave processing is also resistant to noise.

## Harsh Environment

The UIM Series epoxy coated aluminium alloy electronic housing, rated to IP66 and NEMA 4X, is designed to be used outdoors in almost any environment. A stainless steel version of the electronic housing is also available, suitable for offshore installations. The ultrasonic sensors have all titanium wetted surfaces and are designed for process gas temperature from  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ) to  $+80^{\circ}\text{C}$  ( $+176^{\circ}\text{F}$ ).



## Flow computer

Transus Instruments in partnership with Flow Meter Group (FMG) has developed a seamless interface to the FMG model SFC3000 Flow Computer. In combination with the SFC3000, the condition of the meter and its application can be monitored remotely. Using the web interface of the SFC3000, the metering system can be accessed remotely on any PC or even mobile phone. User-friendly screens have been developed to enable quick and easy monitoring of the system. Hourly, daily and weekly averages of diagnostics can be compared to known good conditions, to enable early detection of possible drift or indication of potential problems.

## Accurate and Fast Response

The UIM Series have three or four paths as standard. This results in a stable, accurate flow reading over the full range of flow, pressures and gas composition. The Broadband Continuous Wave signal processing allow more than one path to be interrogated simultaneously avoiding the slow response that is the hallmark of other multi-path meters.

## Intrinsically Safe

The UIM Series are Intrinsically Safe (ATEX/IECEX Intrinsically safe for zone 0). Installation is simple and economical as no special precautions are required for wiring and housing. The versatile keypad and display can be accessed in a hazardous area without special precautions, so start-up and diagnostic monitoring is quick and simple. Field wiring may also be accessed without the need to shut down the meter and lose measurement data. The low energy levels inherent in Intrinsically safe design result in low operating power ( $\ll 1$  watt), making the UIM Series ideal for solar or battery power applications.

## Pressure and Temperature

For applications requiring integrated volume conversion, the UIM Series flowmeter is capable of interfacing directly to pressure and temperature sensors. The standard volume flow is calculated using the traditional volume conversion equations using fixed parameters for gas composition.

## Versatile I/O

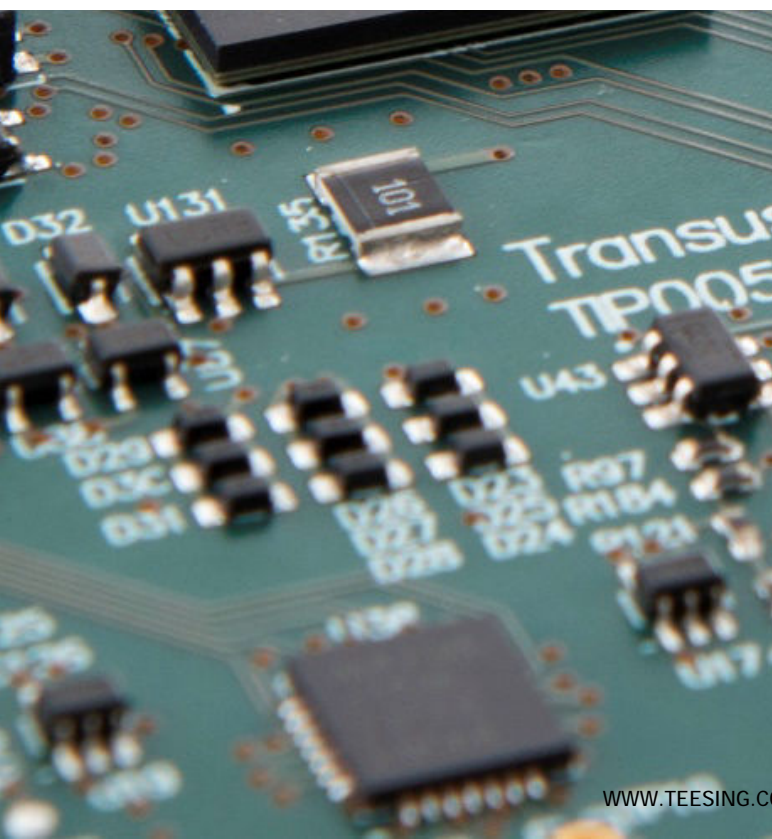
The UIM Series comes standard with the Pulse/Frequency output and a USB port for commissioning and field service. Optional I/O Boards can provide an isolated RS485 and two additional isolated Pulse-Frequency outputs and 4-20mA/HART.

## Simplified Design

With only a single circuit board having all circuits on-board, the UIM Series is extremely simple by design. The two optional expansion boards are fitted directly on the main board.

## International Approvals

The UIM Series complies with IECEx as well as ATEX and CSA requirements for intrinsic safety. Metrological approvals include MID 2014/32/EU, OIML R137-1&2 (class 0.5) certification and AGA-9 compliance. See the respective data sheets for a full list of certifications and approvals.



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