

# RFM-3600

## Advanced Rolling Float Meter

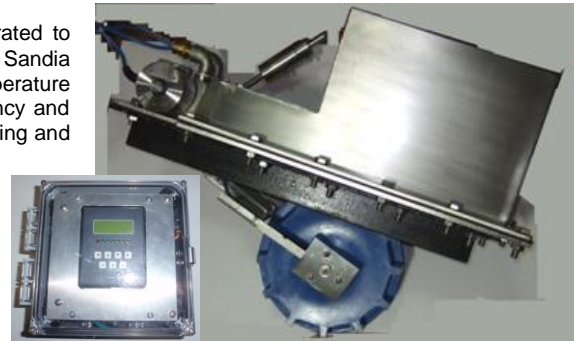


ABS-RFM-TINFO  
REV 1

Leveraging the success of FLE-1000\*, a velocity-sensor wheel feature has been incorporated to achieve the advanced Rolling Float Meter (RFM)\*\* capability. Capitalizing on the field-proven Sandia Laboratory's RFM, significant operational issues have been addressed including high-temperature light plastic composite wheel (to detect extremely low flow velocities), tachometer redundancy and modularity of components to achieve unprecedented levels of precision, ease in commissioning and maintenance.

The field-based DAQ box displays Volumetric Flow and can send out many more WITS\*\*\* data via Serial or Network. The intuitive calibration via keypad LCD interface is made even easier by built in instructions and comments.

\* FLE-1000 is the world's first level measurement utilizing encoder technology co-designed by AbSmart introduced in 2004, \*\* The Rolling Float Meter has been extensively field-tested by Sandia Laboratories of USA and with unclassified published design information \*\*\* Wellsite Information Transfer Specification - mature (30+ yrs) data exchange standard for drilling rig-related information



TECHNICAL  
INFORMATION

## Specifications

### Model

RFM-3600

### Application

Measurement of volumetric liquid or slurry flow in partially-filled fully closed pipes and open trough channels

### Implementation

Two components - liquid pipe level is measured indirectly by angular displacement of wheel arm and velocity by RPM of wheel

Volumetric Flow is calculated from the two components and channel or pipe shape information

### Sensing Range and Limit

RPM: 15,000

Volume Flow: > 5,000 gpm<sup>1</sup>

### Accuracy

Flow Level: < 1 %

RPM: < 0.3%

Volume Flow: < 3% (from full scale flow loop tests)

### Repeatability

Flow Level: 99.2%

RPM: 99.7%

Volume Flow: > 97%

### Power Requirement

18-28 VDC, < 3W consumption

### Outputs and Connectivity

Volume Flow (gpm), Percent Flow, RPM

3-CH Analog 0-10 VDC (as above)

5-CH WITS Level 0 by RS-232 or TCP/IP

### Operating Temperatures

Flow Level Sensor: -20 to 60°C (-4 to 140°F)

Composite Wheel: -40 to 135°C (-40 to 275°F)

Wheel Tachometer

Ambient: -20 to 80°C (-4 to 176°F)

Splashing Fluid: -20 to 135°C (-4 to 275°F)

DAQ Box: -20 to 70°C (-4 to 158°F)

### Dimensions

Sensor System: 24"L x 11"W x 9"H

DAQ Box: 9 1/4"L x 10 1/4"W x 5 1/2"H

### Weights

Sensor System

No cover (open trough): 18.8 kg (41.5 lbs)

With cover (closed pipe): 25 kg (55 lbs)

DAQ Box: 2.5 kg (5.5 lbs)

### Permissible Humidity

Up to 98%

### Vibration Absorption

Sensing Equipment: 5 g (500 Hz)

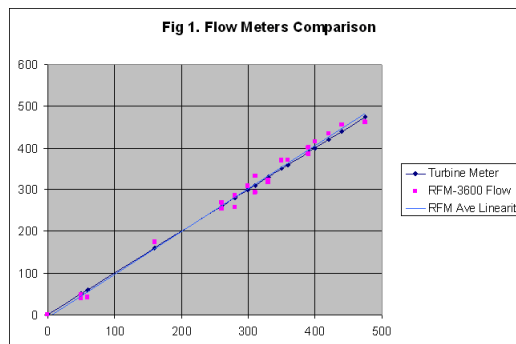
### Approvals / Certification

Sensors: ATEX II 1G EEx ia IIB T4

DAQ Box: UL/ULC, CE IP 66

## Features

- Capable of accurately measuring volume flow in partially-filled pipes and open-troughs, the RFM-3600 is the ONLY suitable option where minimum modification to the current rig design is required
- Digital detection of flow level makes repeatability unmatched by any analog resistive sensor, including the original Sandia Labs potentiometer-based design
- Plastic composite material (at least 5 times lighter than the original all-metal wheel design) minimizes resistance to movement hence increasing reactivity and sensitivity
- Volume Flow calculation in the DAQ box considers effects of surface velocity to wheel buoyancy, and handles rounded, rectangular, and U-shaped channel shapes.



Comparable in accuracy and performance to traditional full pipe flow meters.

From field test data (left), for 0 to 475 gpm, volume flow average difference is 12 gpm

- Wheel tachometer function is implemented with a NAMUR encoder for redundant RPM signals
- Flow Percent parameter is calculated with 100% equivalent to horizontally positioned arm - allowing the RFM-3600 to completely replace and supersede traditional flow paddles
- All encoders and tachometers are certified intrinsically safe<sup>2</sup>
- System remains functional without the bulky stainless steel cover<sup>3</sup> thus removing the safety hazard associated with handling traditional RFM sensors weighing upwards of 45 kg (99 lbs). Installation and maintenance are easily handled by one person, and the cover becomes necessary only for closed pipe application.
- Streamlined and lightweight design make the RFM-3600 at least 2x lighter than a conventional RFM

NOTES: **1** - maximum volume flow changes depending on dimensions and shape of trough or pipe, the value 5,000 gpm is based from a 12-inch rectangular base open trough channel. **2** - DAQ box our outfitted with I.S. barriers. **3** - in the original Sandia Labs design, the cover and frame are inseparable, making the system difficult and hazardous for human handling during installation and maintenance.