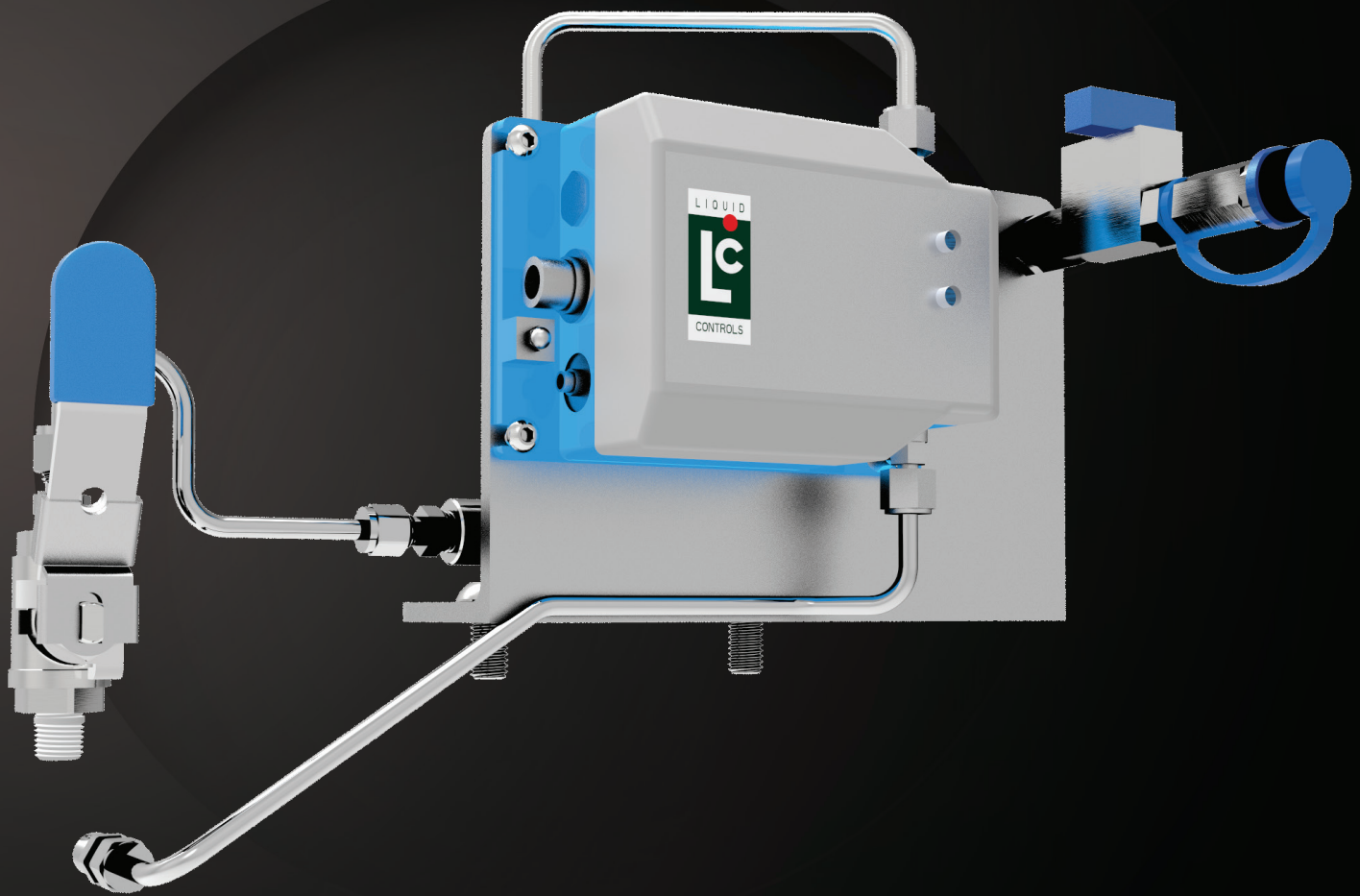


SLIPSTREAM™ DENSITY MEASUREMENT SYSTEM

AUTOMATED DENSITY MEASUREMENT FOR AVIATION FUELING SYSTEMS



LIQUID CONTROLS®

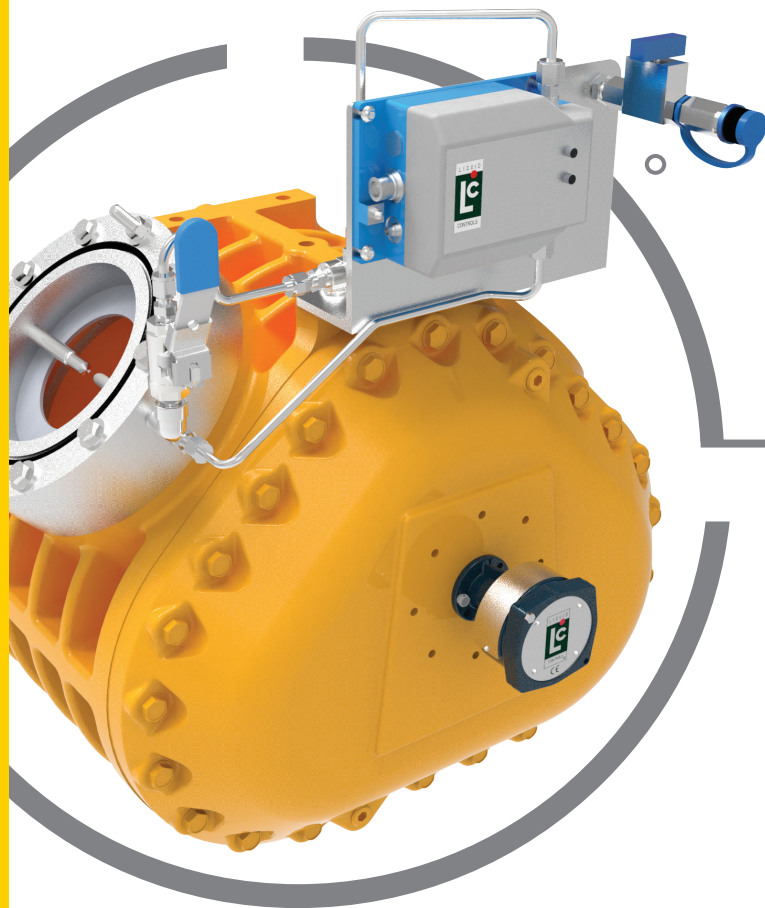
IBEX

KNOW YOUR FUEL

REAL-TIME FUEL DENSITY FOR PRECISION CUSTODY TRANSFER

The Slipstream™ Density Measurement System (SDMS) is an automatic fuel density measurement system for Liquid Controls and Avery-Hardoll flowmeters. The densitometer measures the density of the fuel throughout the duration of a fueling and sends real-time density measurements to Liquid Controls and Avery-Hardoll SMART Registers.

“On current hydrant systems and / or hydrant refueling vehicles, install Slipstream™ Densitometers as an adjunct to current measurement systems. This will aid in better fuel management, environmental regulatory reporting and likely enhance cost savings.”
 ~IATA Technical Fuel Group (TFG) Task Force, Fuel Volume vs. Weight Final Report.



FUEL SAMPLE & SHUT OFF VALVES

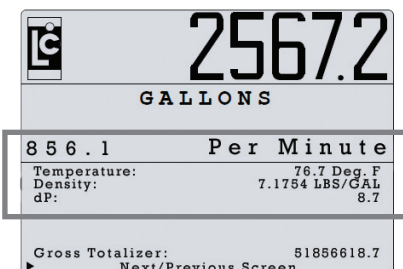
The fuel sample valve allows the operator to retrieve fuel samples from the system. The shut off valve stops the flow of fuel through the densitometer at the outlet port of the flowmeter adapter during sampling.

DENSITOMETER

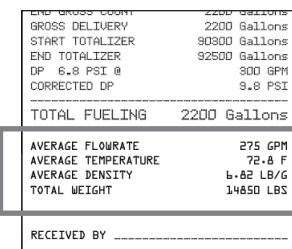
The densitometer continuously measures and sends real-time density measurements to the SMART register where it is displayed on the active fueling screen. The register prints the average density and total weight (mass) fueled on the receipt after the fueling is complete.

DENSITY SENSOR ADAPTER

The Density Sensor Adapter is an anodized aluminum spacer bolted onto the outlet side of the flowmeter. It contains a thermowell which houses the temperature probe and inlet & outlet ports for the measured fuel stream.



Real-time density value on LCR600 screen



Printed average density and total weight

BENEFITS & SPECS

IATA TECHNICAL FUEL GROUP (TFG) TASK FORCE FINAL REPORT ON SLIPSTREAM™ DENSITOMETERS

- Slipstream™ Densitometers reduce human error and provide more accurate information of fuel uplifted than current manual measurements.
- The densitometers provide a mechanism to reduce aircraft over-fueling to a minimum overage of 50-250 pounds per flight, resulting in an economic benefit of \$45-\$225 USD per flight or \$33,000-\$168,000 per day, based on 750 daily flights.
- The densitometers can satisfy EU carbon emissions trading measurement requirement by accurately reporting CO₂ emissions. This may help avoid the penalties of inaccurate submissions.
- Slipstream™ Densitometers provide economic benefit (return on investment) for new equipment with a return of roughly 66:1.

COMPARISON OF TESTED EQUIPMENT				
CRITERIA	SLIPSTREAM DENSITOMETERS	CORIOLIS MASS METERS	MANUAL HYDROMETER	HANDHELD PORTABLE DENSITOMETER
Ease of Use by Operator	●	●	○	○
Continuous Data Readings	●	●	●	●
Multiple Readouts (Mass, Volume, Density, Temperature)	●	●	●	○
Instrument Accuracy Level	●	●	○	○
Equipment Reliability, Maintenance	●	●	●	●
Complexity of New Design Requirements	●	○	n/a	n/a
More Likely to Meet ETS MRV Requirements	●	●	●	○
Intrinsically Safe	●	●	●	●
Easy to Place on Existing Hydrant Systems	●	●	n/a	n/a

KEY
● Excellent
○ Good
○ Fair
● Poor

The data from final report from the Fuel Volume vs. Weight Task Force under IATA's Technical Fuel Group (TFG) is a culmination of field studies and analysis conducted between 2008 through 2010 at five (5) airports in five (5) varying climates around the world.

TECHNICAL SPECIFICATIONS

Accuracy

Digital Density: 0.0001 g/cc
 Temperature: 0.6°F (0.3°C)
 Repeatability: 0.00003 max g/cc

Max Pressure

300 psig (21.7 bar) standard

Operating Temperature

-4° to 140°F (-20° to 60°C)

Sample Rate

100 mS

Materials

Housing: Painted aluminum
 Wetted Parts: SS, Silicon, Epoxy, Glass

Weight

2.5 lb (1135 g)

Dimensions

6.3" x 2.63" x 4"
 (15.7cm x 6.3cm x 10cm)

Power Requirements

5 VDC, 500 mW USB or
 8-30 VDC

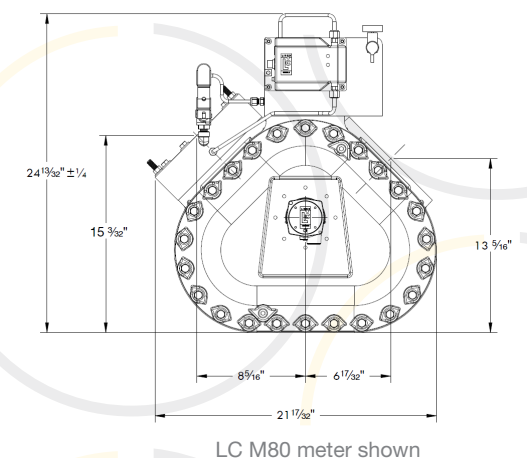
Communication

RS-485

Approvals

EX IIC, AEx, CUL, UL
 (Class 1 Div 1, Group ABCD)

DIMENSIONS (AS INSTALLED)





Liquid Controls proudly manufactures the Avery-Hardoll and LC brand meters. It is the leading manufacturer of positive displacement flowmeters and fuel data management systems in the world.



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Liquid Controls offers a full range of:

- M Series Meters
- MS Series Meters
- LCR II Electronic Register
- LCR600 Electronic Register with FlightConnect®
- Valves
- Air Eliminators & Strainers

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