

IntelliGen® RULV Dispense System

Built-in, robust RDS-01 V2 control module enables liquid dispense volume accuracy and repeatability monitoring

Built on the proven performance of the advanced two-stage dispense technology combined with Entegris' innovative Connectology® filter design, the IntelliGen® RULV dispense system integrates high-purity filtration with repeatable dispense of low-viscosity fluids (1–100 cP or at higher viscosities when dispense pressure does not exceed 29 psi). This pump system is designed exclusively for use with TEL Clean Track™ ACT™ 12/ACT 8 track systems.

Developed as a sanitized dispense system for lithography process, the IntelliGen RULV dispense system can dispense a more uniform topography of photochemical coating on the wafer. It also helps to shorten start-up times and provides intelligent dispense diagnostics. The compatible Impact® 8G or Impact 2 V2 (OF style) filter easily slides into the IntelliGen RULV system's compartment. Fluids pass through the Impact filter at the optimum flow rate for the specific retention rating, improving throughput and increasing uptimes.

The integrated, dual pressure sensors provide real-time alerts and enhance filter priming by providing several confirmation features including dispense confirmation, cycle time confirmation, and delta P confirmation. These confirmations help to prevent costly wafer defects caused by coating problems and random DC error occurrences triggered by backlash issues at lower ready pressure levels.

The state-of-the-art air detection feature pinpoints when air enters the outlet tubing from a leak or from minute air bubble formations that gradually accumulate over time. The RDS-01 controller's superior performance, and interactive diagnostics make the IntelliGen RULV dispense system the right choice for low viscosity photoresist to ensure dispense repeatability, longer filter life, and great return on investment.



Advanced two-stage system with built-in interface module enables superior filtration and dispense

FEATURES & BENEFITS

Two-stage dispense technology with Connectology filter design	<p>Integrates high-purity filtration with excellent dispense repeatability of low-viscosity fluids (1–100 cP or higher viscosities when dispense pressure does not exceed 29 psi)</p> <p>Independently optimized dispense and filtration sequences</p> <p>Advanced closed-loop software control with several additional fault detection features</p> <p>Integrates with Impact 8G or Impact V2 (OF style) filter</p> <ul style="list-style-type: none">• Slides into ULV compartment for bubble, gel, and particle removal• The RULV pump is applicable to only Tokyo Electron Act 12/Act 8 tools
Built-in technology enhancements — PCB and dual sensors added	<p>Enhanced filtration control</p> <p>Expandable capabilities without memory limitations</p> <p>Extension of confirmation tools</p> <ul style="list-style-type: none">• Delta P <p>Better startup and filter priming technology</p> <p>Real-time clock technology with traceability</p>
More reliable dispense settings	<p>Ball screw incorporated into dispense motor</p> <p>Lower ready pressure setting available</p>
Improved chemical turnover technology	<p>Chamber design facilitates chemical turnover</p> <p>Adjustable fill chamber reduces hold-up volume</p> <p>Valve design more effectively clears contaminants</p>
Initial cleanliness technologies	<p>Introduction of unique post production cleaning procedure</p>
Optional enhancements	<p>Flowmeter RSQ confirmation</p> <ul style="list-style-type: none">• Finer one-shot volume detection• Microbubble detection

SPECIFICATIONS

Dispense performance	Volume	0.01–10.0 mL in 0.001 mL increments
	Rate	0.01– 3.0 mL/sec in 0.001 mL/sec increments
	Repeatability	≤0.02 mL 3 sigma
	Viscosity range*	1–100 cP
	Maximum dispense design pressure**	0.21 MPa (30 psi)
Recharge performance	Fill rate, filtration rate, vent rate, purge rate	0.1– 3.0 mL/sec in 0.001 mL/sec increments
	Vent frequency	Auto-venting or 1–10,000 dispense cycles
Mechanical	Wetted surfaces	Modified PTFE, PTFE, Kalrez®
	Connection type	Inlet: Insert style, Super Type Pillar® Outlet and vent: Flaretek®
	Filter	Impact 8G or Impact 2 V2 (OF style)
	Inlet, outlet and vent tubing	OD: 6.35 mm (0.25") or 6.0 mm (0.24") ID: 3.97 mm (0.156") or 4.0 mm (0.16")
	Inlet gas type	Regulated N ₂ or CAD
	Operating conditions	Minimum operating pneumatic pressure: 0.26 MPa (38 psi) Maximum operating pneumatic pressure: 0.28 MPa (40 psi) Pneumatic leak pressure: 0.30 MPa (43 psi)
	Vacuum	-68 kPa (20 in-Hg min)
Dimensions	Height	303.5 mm (11.95")
	Width	118.0 mm (4.65")
	Depth	156.8 mm (6.17")
Weight	Approximately 4.5 kg (10 lbs)	
Electrical	Current rating	1.25A maximum
	Input voltage (system)	24 VDC ±10%
	Serial communication	Specifications are dependent on interface module use
	Parallel communication	Triggers and acknowledgments
Certifications	See provided documentation	
Environment	Indoor use only	
	Altitude below 2000 m (2187.22 yd)	
	Ambient temperature 5° – 40°C (41° – 104°F)	
	Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F)	
	Main supply fluctuations from 22 – 26 VDC	
	Transient overvoltages of overvoltage category II	
	Pollution degree 2	

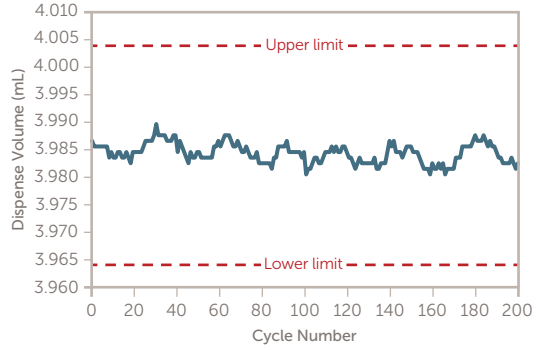
*Depends on tool configuration. Contact applications support for detailed window of operation.

**Maximum pressure is a limit on the Window of Operation. Actual volumes and rates may be restricted to comply with the pressure limits for a given viscosity, tubing diameter, tubing length, and tubing height.

PERFORMANCE DATA

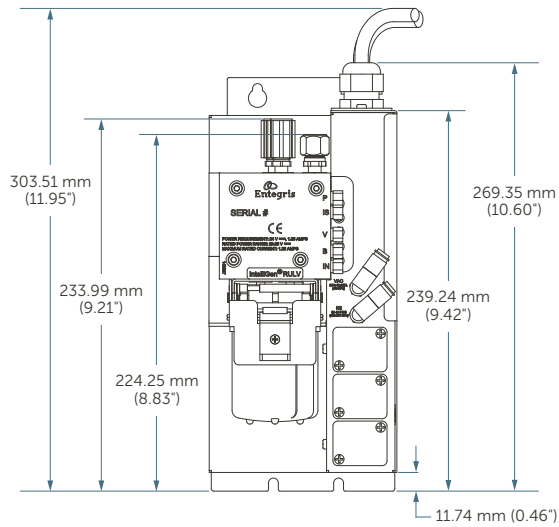
This graph shows dispense repeatability trending over a span of 200 dispense cycles at a dispense rate of 1.0 mL/sec.

IntelliGen ULV Dispense Repeatability
1.3 cP Fluid at 1.0 mL/sec Dispense Rate

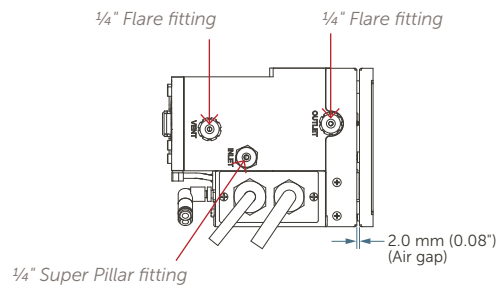


DIMENSIONS

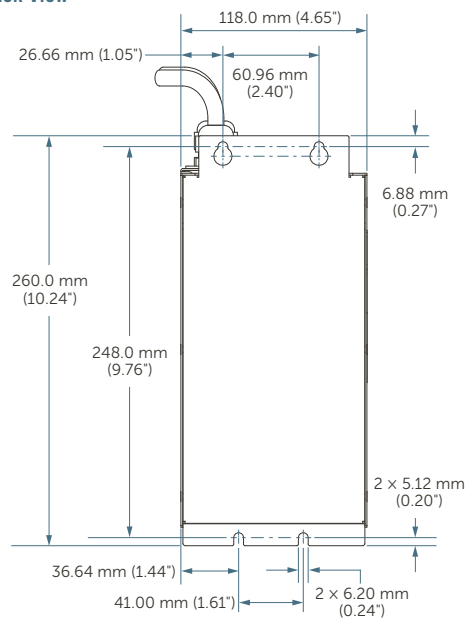
Front View



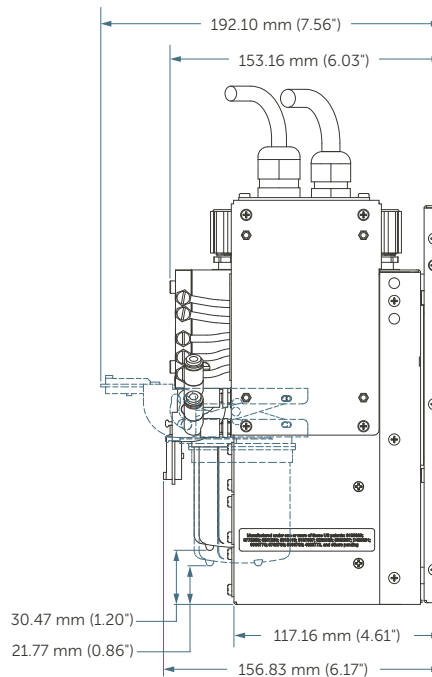
Top View



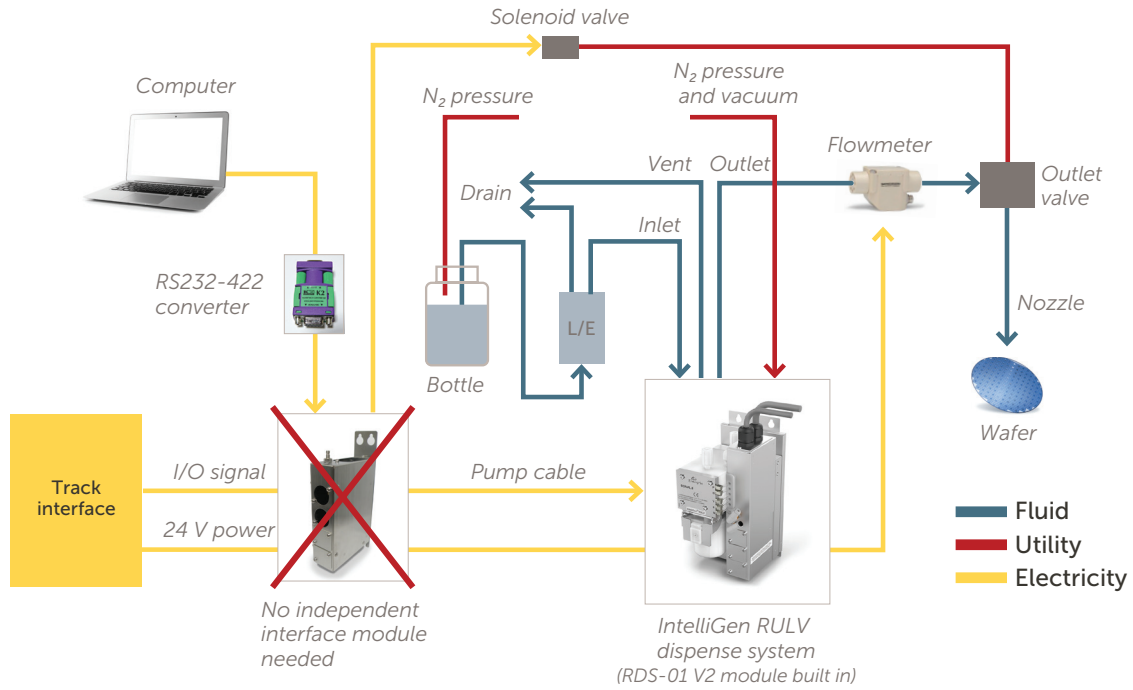
Back View



Side View



SYSTEM SCHEMATIC – FLUID PIPING, UTILITY, AND ELECTRICITY



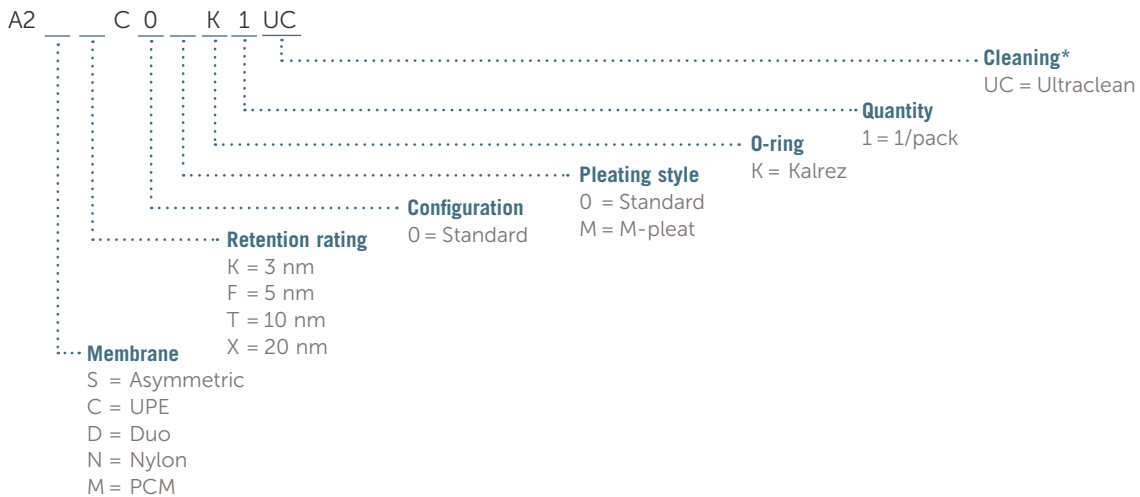
ORDERING INFORMATION – DISPENSE SYSTEM

The following table lists the IntelliGen RULV dispense system and accessories part numbers.

Part number	Description
IGLNVPBPF1F1	Dispense system: Inlet fitting Super Pillar type/Outlet and vent fitting Flaretek type: IntelliGen RULV for RDS01 retrofit with EX clean
IGLNPS01	Cable parts: RS232C host cable for RULV
IGLNPS02	Cable parts: RS232C 5CM host cable for RULV
IGLNPS03	Cable parts: RS422 host cable PLS GND for RULV
IGLNPS04	Cable parts: RS422 DG chain cable PLS GND for RULV
IGLNPS05	Flowmeter cable parts: Flowmeter RS485 2M cable for RULV
IGLNPS06	Flowmeter cable parts: Flowmeter RS485 5M cable for RULV

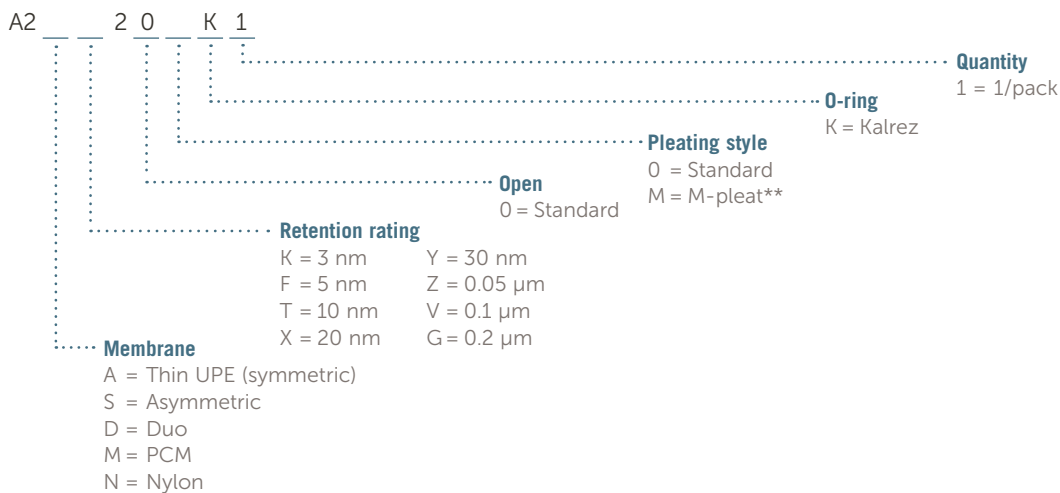
The following ordering information serves as a guide. Please contact your local representative to confirm part numbers.

Impact 8G and 8G UC Series Filters: part number



*Cleaning only applies to Impact 8G UC series filters.

Impact 2 V2 Filters: part number



**The M-pleat style only applies to Impact filters with a UPE membrane of up to 30 nm.

RDS-01 V2 CONTROLLER WITH OPTIONAL FLOWMETER

In lithography processes, it is advantageous to observe photochemical flow quality to ensure flow consistency and a highly repeatable process. Integrating a sensitive flow monitoring system will enable better quality control and defect reduction.

Building on the repeatability of Entegris' IntelliGen dispense system product line, Entegris has developed the robust RDS-01 V2 controller that provides the ideal interface for connecting the IntelliGen two-stage dispense system to a wide range of semiconductor coating systems.

The RDS-01 V2 controller is built as one compartment of the IntelliGen RULV dispense system. This makes it easy for users to upgrade their dispense unit with the robust, RDS-01 V2 controller. For an added advantage monitoring flow characteristics, a flowmeter may be integrated into the RDS-01 V2 controller.

The optional flowmeter allows reliable observation of the liquid flow profile and flow volume in the outlet tube. It is a very sensitive system that can detect a slight change in the flow characteristic. Its MMI software records the flow profile and flow volume and

detects abnormal events that cause a change in the flow characteristic. Early detection of abnormal events helps reduce costly defects and prevent yield loss.



IntelliGen RULV dispense system – RDS01 V2 controller (in yellow frame) built-in design and flowmeter (bottom image).

ORDERING INFORMATION – FLOWMETER AND ACCESSORIES

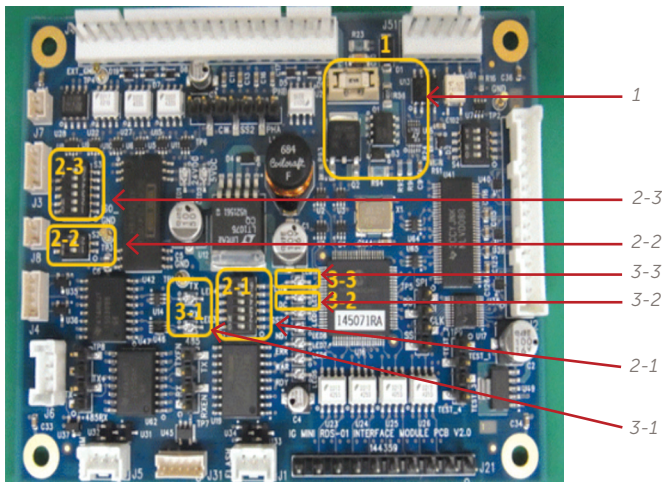
Part number	Description
IGLFMHM01	IG flowmeter type 1 OD 6.35 mm
IGRDS01SP01	IG module ver.2 RDS01 RS422 main cable
IGRDS01SP02	IG module ver.2 RDS01 RS422 chain cable

PERFORMANCE DATA – RDS-01 V2 CONTROLLER

Electrical performance data

Number	Point	Content
1	Power circuit	1-1 Reinforcement of protection circuit (overvoltage, overcurrent, and reverse input)
2	DIP switch	2-1 Two DIP switches were integrated into one for the pump address
		2-2 Separated a 2-POS type DIP switch for RS422 termination
		2-3 Added a 6-POS type DIP switch for the RS422/RS485 fail-safe in order to stabilize a signal on a static state level (optional use)
3	LED onboard	3-1 Added LEDs in 232/422 TX and 232/422 RX serial communication lines
		3-2 Added LED for the DC-Error
		3-3 Added LED for the FLOW-Error

POWER CIRCUIT LAYOUT



RDS-01 V2 controller.

PERFORMANCE DATA – FLOWMETER

Performance of the optional flowmeter, SLQ-QT500 (all data for medium IPA, 23°C, unless otherwise noted)

Parameter	SLQ-QT500 (IPA)	SLQ-QT500 (H ₂ O)
Full scale flow rate	2000 (120) µL/s (mL/min)	2000 (120) µL/s (mL/min)
Flowmeter output limit ¹	2500 (150) µL/s (mL/min)	2500 (150) µL/s (mL/min)
Accuracy below full scale (whichever error is larger) ²	5% of measured value	5% of measured value ³
	0.125% of full scale	0.125% of full scale
Repeatability below full scale (whichever error is larger)	0.5% of measured value	0.5% of measured value
	0.0125% of full scale	0.0125% of full scale
Temperature coefficient (additional error per °C, whichever is larger)	0.15% of measured value/°C	0.15% of measured value/°C
	0.00375% of full scale/°C	0.00375% of full scale/°C
Flow detection response time	<50 ms	<50 ms
Response time on power-up	25 ms	25 ms
Operating temperature	5° to 50°C	5° to 50°C
Ambient storage temperature ⁴	-10° to 60°C	-10° to 60°C
Operating pressure ⁵	12 bar (175 psi)	12 bar (175 psi)
Proof pressure ⁵	50 bar (725 psi)	50 bar (725 psi)

1. Flow rate at which the flowmeter output saturates.

2. Accuracy with straight inlet tube.

3. Accuracy below ±1000 µL/s (see the chart in section 2 for the accuracy between 1000 µL/s and 2500 µL/s).

4. Uncondensed, flow path empty.

5. Pressure limited by PFA tubing.

ELECTRICAL SPECIFICATION – FLOWMETER

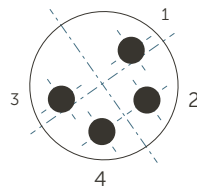
DC characteristics

Parameter	Minimum	Typical	Maximum
Power supply DC, VDD	3.3 V	5.1 V	3.7 V
Operating current	—	3.5 V	—

ELECTRICAL CONNECTOR AND PINPOINTS – FLOWMETER

Electrical pinpoints

Pin	Description
1	SDA (data)
2	GND
3	VDD
4	SCL



Connecting pinpoint.

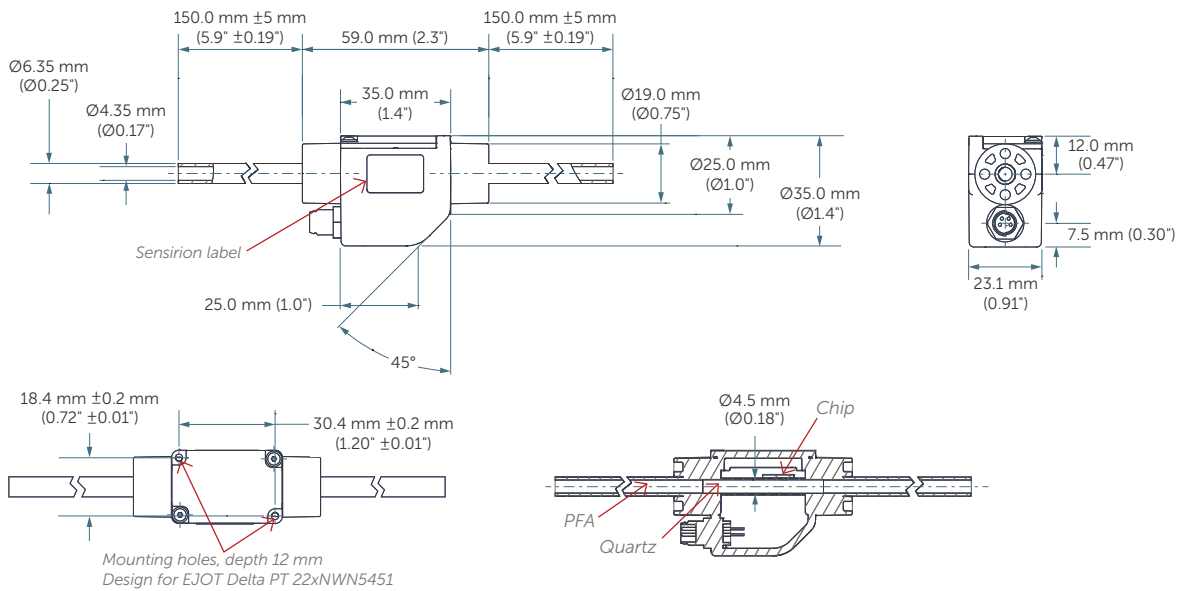
FLUIDIC CONNECTION – FLOWMETER

Fluidic specification and pressure rating

Parameter		
Wetted materials	Internal sensor tube material	Quartz
	Connection tube	PFA
Fluidic connection	PFA tube, 6.35 mm (1/4") OD, 4.35 mm ID	
Pressure drop @ 120 mL/min IPA, 23°C	<2 mbar	
Total internal volume	<5 mL	

DIMENSIONS – FLOWMETER

Parameter	
Flowmeter body dimension	59 mm H x 35 mm W x 23.2 mm D (2.3" H x 1.4" W x 0.91" D)
Flowmeter overall length	360 mm ±10 mm (14" ±0.4")
Total mass	~45 g
Inner diameter sensor tube	4.5 mm (0.18")
Inner diameter PFA tube	4.35 mm (0.17")



MATERIALS OF CONSTRUCTION – FLOWMETER

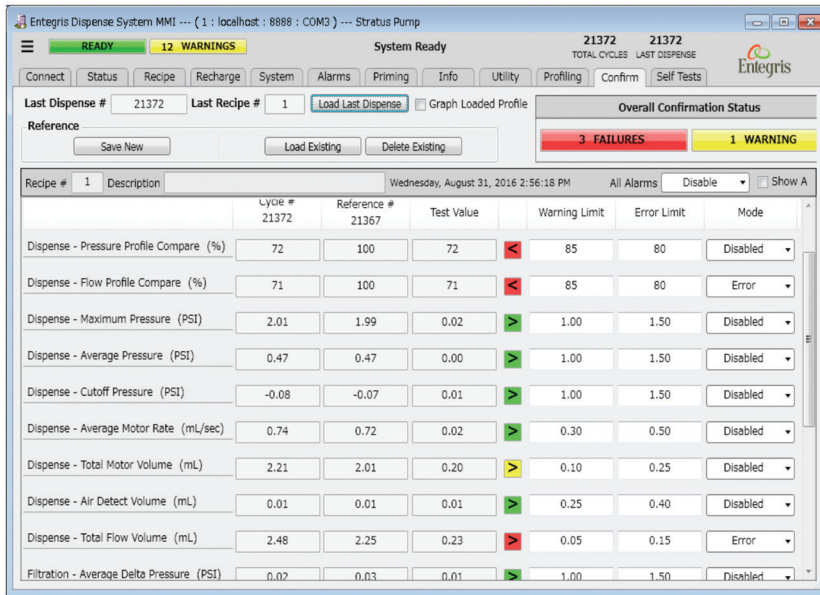
Wetted materials

Component	Material	Flammability
1/4" Connection tubing	PFA	UL-Q4-V-0
Capillary	Quartz	Not flammable
Housing	PPS	UL-Q4-V-0
Screw and electrical connector	Stainless steel	Not flammable
Cable	Copper	Not flammable
	ETFE	UL-Q4-V-0

APPLICATION DATA – FLOWMETER

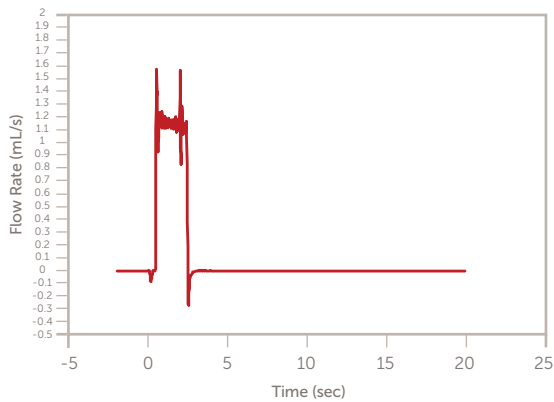
Below is the RULV alarm page demonstrating two types of alarms that alert when the flow characteristic of the last cycle is different from that of the reference (0.2 mL difference in flow volume). Flow profiles shown in cycle 21367 and cycle 21372 are for the reference and the last cycle, respectively.

It is hard to notice the difference between cycle 21367 (reference) and 21372 with your eyes. However, the flow sensor is incredibly sensitive and can detect even the slightest change in flow volume and alert the user. This reliable flowmeter enables users to easily monitor dispense flow consistency and achieve a highly repeatable production process.



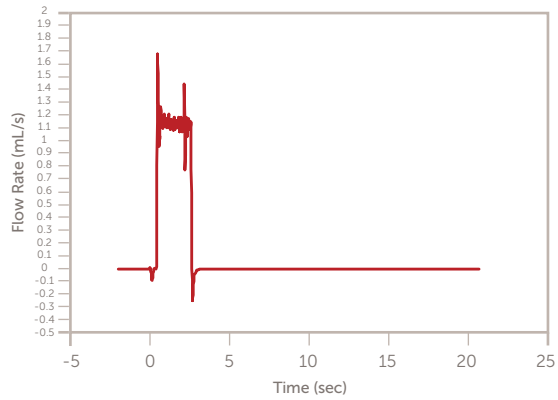
Confirm page on MMI screen. Two types of flow sensor alarms alert when flow volume is different from that of the reference.

Cycle 21367 (Reference)



Flow profile of reference profile, dispense rate is 1.0 mL/s: dispense volume is 2.0 mL.

Cycle 21372



Flow profile of last cycle profile, dispense rate is 1.0 mL/s: dispense volume is 2.2 mL.

FOR MORE INFORMATION

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