SL9000/SL9100/SL9200

Flow Computers for Liquid and Gas Applications

Description

The SL Series Flow Computers consist of three panel-mounted display units for use with liquid and gas flow meters. All units are easily programmed through the front keypad or with a Windows®-based PC software program. Each device has multiple assignable outputs allowing tremendous flexibility to set the units up for analog output, batch control and alarms. The display on the flow computers is an easy to read, two-line, twenty-character backlit LCD with a character height of three-tenths of an inch. Measured and calculated parameters can be assigned to the display in an easy to understand format.

Application

The SL9000 Flow Computer is capable of 16-point linearization, providing high accuracy when used with flow meters calibrated over their full extended range. It is designed for use in volumetric liquid and gas applications where temperature and pressure compensation are not required.

The SL9100 is designed for liquid applications where compensation is required for variation in fluid operating temperature. The unit can be configured to display volumetric or mass units of measure with UVC and Strouhal – Roshko temperature compensation for variations in viscosity and density due to temperature.

The SL9200 Flow Computer has the same temperature compensation capability for liquid applications as the SL9100, plus the ability to provide pressure and temperature compensation for gas applications. The absolute viscosity of the gas is corrected for variation in temperature and the density of the gas is calculated using temperature and pressure measurements. The SL9200 can display and output compensated volumetric data in actual or standard units as well as mass units of measure.

Features

For SL9000 Series

- Pulse or sine wave inputs
- 4–20 mA analog output
- Menu-assignable relay alarm outputs
- Batch control relay output (not available on SL9200)
- 16-point linearization capability
- Two-line backlit LCD display
- RS-232 port or optional RS-485

SL9000/SL9100/SL9200 Series

Flow Computers for Liquid and Gas Applications

Features

For SL9000 Series (continued)

- DIN enclosure with two-piece wiring connector
- Windows®-based PC programming software
- AC- or DC-powered

For SL9100 add

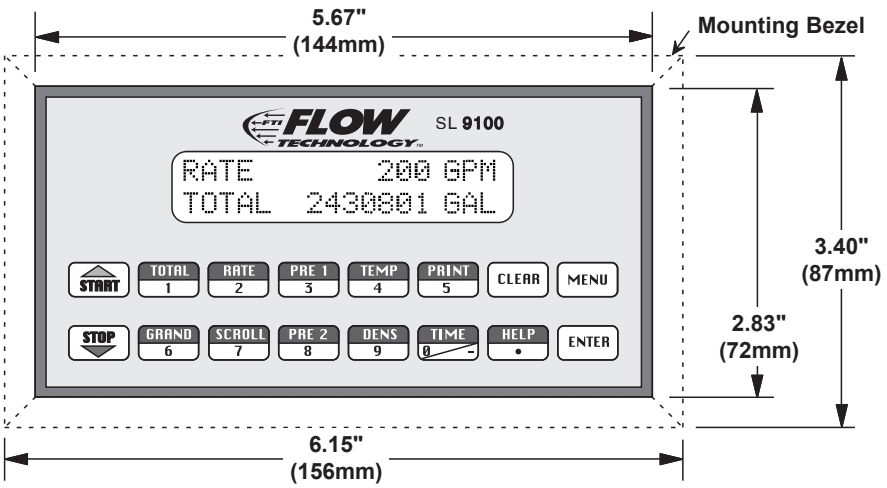
- Liquid, temperature compensation for viscosity and density
- Strouhal – Roshko temperature compensation
- 40-point linearization
- Analog and RTD input for temperature
- Volumetric or mass display and output
- Stores temp vs viscosity and density data for up to 10 fluids with fluids selectable from front panel

For SL9200 add

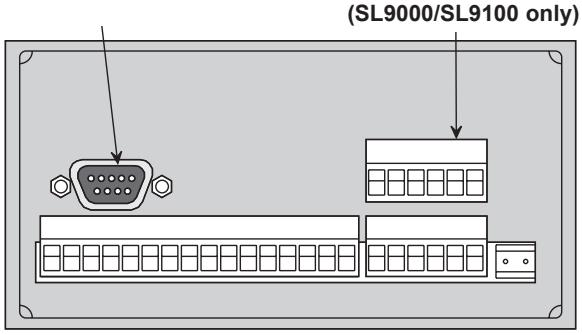
- Liquid, temperature compensation for viscosity and density
- Strouhal – Roshko temperature compensation
- Gas, temperature and pressure compensation for viscosity and density
- 40-point linearization
- Analog and RTD input for temperature
- Analog input for pressure
- Volumetric or mass display and output

Dimensions

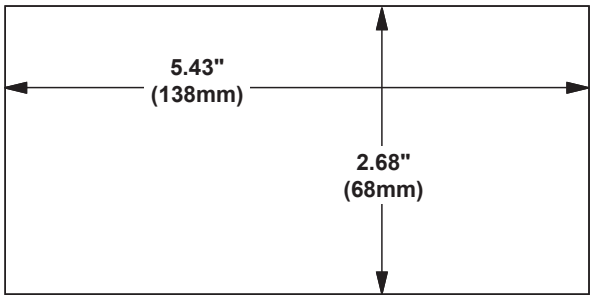
Front



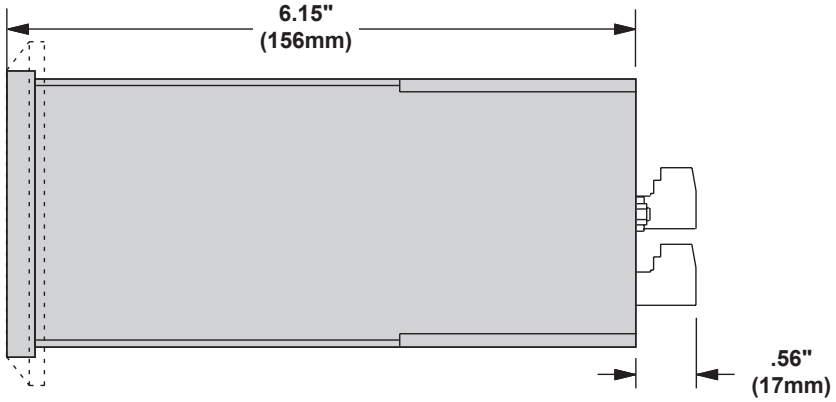
Back



Panel Cut-out



Side Panel



Specifications

Display
2-line, 20-character backlit, 0.3" high LCD Display

Power

SL9000/SL9100	110 VAC 220 VAC, 12 VDC, 24 VDC
SL9200	85–276 VAC, 24 VDC

Environmental *

Operating Temperature *	
Standard:	32° F to +122° F (0° C to +50° C)
Optional:	-4° F to 131° F (-20°C to 55° C)
Storage Temperature	-40° F to 185° F (-40° C to +85° C)
Humidity	0–95% Non-condensing Materials: U.L., CSA, VDE approved

Serial Port
9-Pin Connector RS-232 Port Standard for Bidirectional Communications with Standard PC or Optional RS-485

Inputs

Analog (SL9200 only)

Ranges:	Voltage: 0–10 VDC, 0–5 VDC, 1–5 VDC
Current:	4–20 mA, 0–20 mA
Basic Measurement Resolution:	16-bit
Calibration:	Self Calibration & Auto-zero Continuously

Pulse

Number of Flow Inputs:	One
Input Impedance:	10 k normal
Pull Up Resistance:	10 k to 5 VDC
Pull Down Resistance:	10 k to common
Minimum Count Speed:	User-selectable
Maximum Count Speed:	0 to 50 kHz
Over-Voltage Protection:	50 VDC
Fast Transient:	Protected to 500 VDC

Compensation: (SL9100/SL9200 only)
(selectable for temp., pressure, density, or not used)

Operation:	Ratiometric
Accuracy:	0.02% FS at 20° C
Thermal Drift:	Less than 50 ppm/°C
Basic Measurement Resolution:	16-bit
Update Rate:	1 update/sec minimum
Automatic Fault Detection:	
Transient Protection:	500 V
Reverse Polarity:	No ill effects
Over-Voltage Limit (Input):	50 VDC
Available Input Ranges:	
Voltage:	0–10 VDC, 0–5 VDC, 1–5 VDC (SL9000 only)
Current:	4–20 mA, 0–20 mA
Resistance:	100 ohms DIN RTD (3-wire)

Control Inputs (SL9000/SL9100 only)

Input Scan Rate	10 scans per second
Logic 1	4–30 VDC
Logic 0	0–0.8 VDC
Transient Suppression	500 V fast transient
Input Impedance	100 k
Pull Down Resistance	10 k soft selectable

Excitation Voltage

Menu-assignable	5, 12 or 24 VDC @ 100mA (SL9200: 24 VDC)

Outputs

Relay Outputs
(Batch control not available for SL9200)
(Menu-assignable to Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm, Pulse Output or General Purpose Warning)

Number of Relays	
SL9000/SL9100:	2 Standard, 2 Additional Optional
SL9200:	2 Standard
Contact Style	Form C contacts
Contact Ratings	240 V, 5 amp; 30 VDC @ 5 amps
Fast Transient Threshold	1000 V

Analog Outputs

Menu-assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Pressure. (Dependent on Unit Options)

Type	Isolated Current Sourcing
Available Ranges	0–20 mA, 4–20 mA (menu-selectable)
Resolution	12-bit (SL90 & SL91), 16-bit (SL92)
Accuracy	0.05% FS at 20°C
Update Rate	1 update/sec (SL90 & SL91) 5 update/sec (SL92)
Temperature Drift	Less than 200 ppm/°C
Maximum Load	1000 ohms
Compliance Effect	Less than .05% Span 60 Hz
Rejection	40 dB minimum
EMI	No effect at 3 V/M
Calibration	Operator Assisted Learn Mode
Averaging	User entry of DSP Averaging constant to cause smooth control action

Isolated Pulse Output

Menu-assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total. (Dependent on Unit Options)

Pulse Output Form	PhotoMOS Relay (SL90 & SL91) Open Collector NPN (SL92)
Maximum On Current	25 mA (SL90 & SL92), 100 mA (SL91)
Maximum Off Voltage	30 VDC
Saturation Voltage	1.0 VDC (SL90 & SL92), 0.4 VDC (SL91)
Maximum Off Current	0.1 mA
Pulse Duration	User-Selectable
Fault Protection	
Reverse Polarity:	Shunt Diode
Over-current Protected	
Over-voltage Protected	
Transient Protection:	500 VDC

Approvals
CE marked compliant w/ EMC directive 89/336/EEC (1989) Light Industrial Class I

Enclosures

	NEMA 4X, Waterproof enclosures
NEA1287JFG	One or two controller mounting
NEA18149JFG	Up to three controller mounting

SL9000 Series Flow Computers

Model Numbering System

S L 9 0 – ☐ – ☐ – ☐

Flow Computer
90 = SL9000

Operating Voltage
1 = 110 VAC*
2 = 220 VAC
3 = 12 VDC
4 = 24 VDC

Control Outputs
A = 2 Form C; SPDT Relays*
B = 4 Form C; SPDT Relays

Options
Blank = Standard*
2 = RS-485 Modbus
ET = Extended Temperature Range
-4° F to 131° F (-20° C to 55° C)

S L 9 1 – L – ☐ – ☐ – ☐

Flow Computer
91 = SL9100

Display
LCD

Operating Voltage
1 = 110 VAC*
2 = 220 VAC
3 = 12 VDC
4 = 24 VDC

Control Outputs
A = 2 Form C; SPDT Relays*
B = 4 Form C; SPDT Relays

Options
Blank = Standard*
2 = RS-485 Modbus
ET = Extended Temperature Range
-4° F to 131° F (-20° C to 55° C)

S L 9 2 – L – ☐ – ☐

Flow Computer
92 = SL9200

Display
LCD

Operating Voltage
1 = 85–276 VAC*
3 = 24 VDC

Options
Blank = Standard*
1 = RS-485 Modbus
ET = Extended Temperature Range
-4° F to 131° F (-20° C to 55° C)

*Standard Configuration

Rear Panel Terminal Allocation

SL90

1	DC OUTPUT			FLOW IN
2	PULSE IN 1			
3	PULSE IN 2			
4	COMMON			
5	DO NOT USE			
6	DO NOT USE			
7	DO NOT USE			
8	DO NOT USE			
9	CNTR IN 1			SEE USER MANUAL
10	CNTR IN 2			
11	CNTR IN 3			
12	COMMON			
13	PULSE OUTPUT (+)			
14	PULSE OUTPUT (-)			
15	ANALOG OUTPUT (+)			0-20mA or 4-20mA
16	ANALOG OUTPUT (-)			
17	NC	25	NC	(Optional)
18	COM RLY1	26	COM RLY3	
19	NO	27	NO	
20	NO	28	NC	(Optional)
21	COM RLY2	29	COM RLY4	
22	NO	30	NO	
23	AC LINE	DC (+)	POWER IN	
24	AC LINE	DC (-)		

SL91

1	DC OUTPUT			FLOW IN
2	PULSE IN 1			
3	PULSE IN 2			
4	COMMON			
5	————	Vin (+)		COMP. IN
6	RTD EXCIT (+)			
7	RTD SENS (+)	Iin (+)		
8	RTD SENS (-)			
9	CNTR IN 1			SEE USER MANUAL
10	CNTR IN 2			
11	CNTR IN 3			
12	COMMON			
13	PULSE OUTPUT (+)			
14	PULSE OUTPUT (-)			
15	ANALOG OUTPUT (+)			4-20mA
16	ANALOG OUTPUT (-)			
17	NC	25	NC	(Optional)
18	COM RLY1	26	COM RLY3	
19	NO	27	NO	
20	NO	28	NC	(Optional)
21	COM RLY2	29	COM RLY4	
22	NO	30	NO	
23	AC LINE	DC (+)	POWER IN	
24	AC LINE	DC (-)		

SL92

1	DC OUTPUT			FLOW IN
2	PULSE IN	Vin +		
3	————			
4	COMMON			
5	RTD EXCIT (+)			TEMPERATURE IN
6	RTD SENS (+)			
7	RTD SENS (-)			
8	DC OUTPUT			
9	RTD EXCIT (+)			PRESSURE (TEMP 2) 4-20mA IN
10	RTD SENS (+)			
11	RTD SENS (-)			
12	PULSE OUTPUT (+)			
13	PULSE OUTPUT (-)			
14	ANALOG OUTPUT 1 (+)			
15	ANALOG OUTPUT 2 (+)			
16	ANALOG OUTPUT COMMON (-)			
17	NO			
18	COM RLY1			
19	NC			
20	NC			
21	COM RLY2			
22	NO			
23	AC LINE	DC (+)	POWER IN	
24	AC LINE	DC (-)		

Specifications are for reference only and are subject to change without notice.

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