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 flowmeters. 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
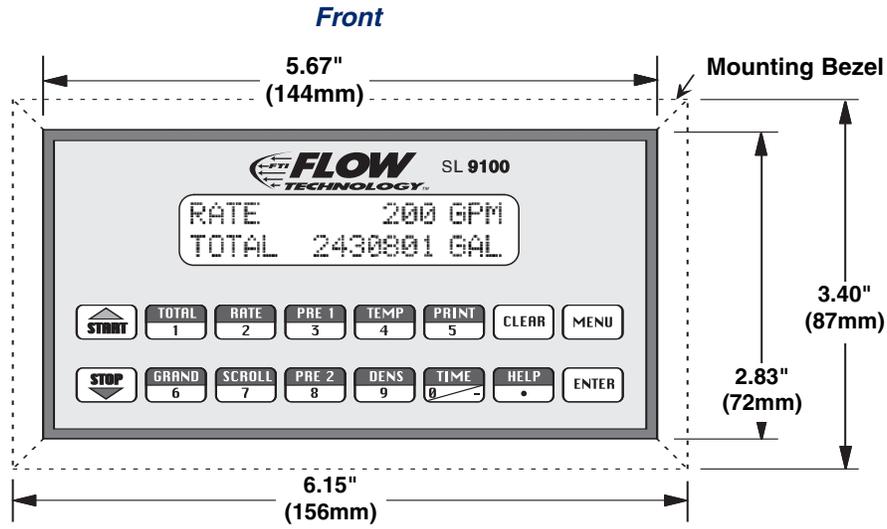- AC- or DC-powered

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
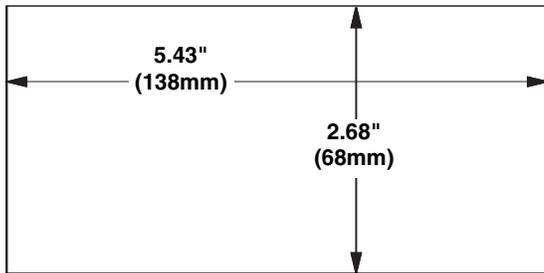
For SL9200 add
- Liquid, temperature compensation for viscosity and density
- Strouhal – Roshko temperature compensation
- Gas, temperature and pressure compensation for viscosity and density
- 40-point linearization
- Analog and RTD input for temperature
- Analog input for pressure
- Volumetric or mass display and output

Dimensions

Front

RATE   200 GPM
TOTAL   2430801 GAL

5.67"
(144mm)

Mounting Bezel

3.40"
(87mm)

2.83"
(72mm)

6.15"
(156mm)

| START | TOTAL 1 | RATE 2 | PRE 1 3 | TEMP 4 | PRINT 5 | CLEAR | MENU |
| STOP | GRAND 6 | SCROLL 7 | PRE 2 8 | DENS 9 | TIME 0 - | HELP . | ENTER |

FLOW TECHNOLOGY   SL 9100

Panel Cut-out

5.43"
(138mm)

2.68"
(68mm)

Back

Serial Port RS-232

Optional Relay Contacts
(SL9000/SL9100 only)

Side Panel

6.15"
(156mm)

.65"
(17mm)
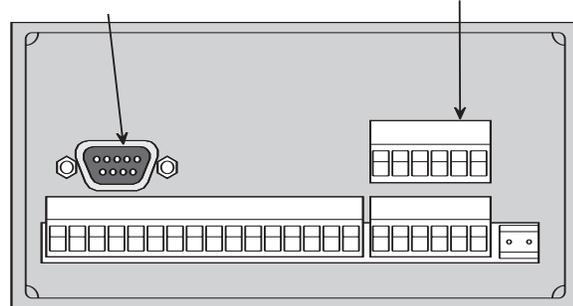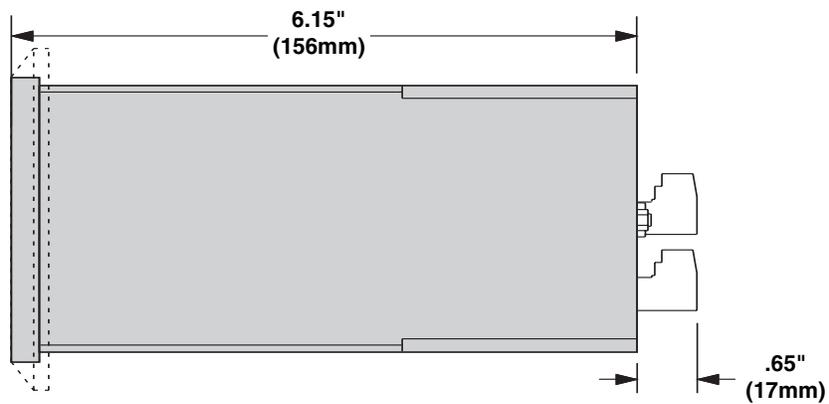
Specifications

Display

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

Power

SL9000/SL9100

SL9200

110 VAC 220 VAC, 12 VDC, 24 VDC, 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
- *Overvoltage 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   Photo Mos 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

Model Numbering System

SL90

| 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)

SL91

| 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)

SL92

| 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	
10	CNTR IN 2	SEE USER MANUAL
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
18	COM RLY1	26	COM RLY3
19	NO	27	NO
20	NO	28	NC
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	
10	CNTR IN 2	SEE USER MANUAL
11	CNTR IN 3	
12	COMMON	
13	PULSE OUTPUT (+)	
14	PULSE OUTPUT (-)	
15	ANALOG OUTPUT (+)	4-20mA
16	ANALOG OUTPUT (-)	
17	NC	25	NC
18	COM RLY1	26	COM RLY3
19	NO	27	NO
20	NO	28	NC
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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