ES-747

Flow Computer for Liquid and Gas Applications

Features

- Supports Pulse Producing Flowmeters
- Rate/Total and Batching Functions
- Universal Viscosity Curve (UVC) and Strouhal/ Roshko Advanced Linearization Methods
- Gas & Liquid Flow Equations (Volume, Mass, Corrected Volume)
- API 2540, AGA-7 Equations
- 10 Selectable Fluid Tables
- Advanced Batching Features: Overrun Compensation, Print End of Batch
- Menu Selectable Hardware & Software Features
- Data Logging
- Two Line LCD, OLED or VFD Display

- Isolated Pulse and Analog Outputs Standard
- RS-232 Port Standard, RS-485 Optional
- Windows™ Setup Software
- DDE Server & HMI Software Available

Description:

The ES-747 Flow Computer satisfies the instrument requirements for pulse producing flowmeters in liquid and gas applications. Multiple flow equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported

The versatility of the ES-747 permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/ output while configuring the instrument.

The isolated analog output can be chosen to follow volume flow, corrected volume flow, mass flow, temperature, pressure or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data recording, transaction printing, or for connection to a computer.

Front panel selection of fluid type is supported.

Linearization options include UVC, Strouhal/Roshko and 40 point linearization tables.

A Service or Test mode is provided to assist the user during start- up system check out by monitoring inputs and exercising outputs and printing system setup.

Specifications:

Flow Meters and Computations

Meter Types: Supports pulse producing meters including: vortex, single rotor turbine, magnetic, PD flowmeter
Linearization: 40 point table, UVC table or Strouhal/Roshko
Computations: Volume, Corrected Volume & Mass
Fluid Computations: Density, Viscosity

Environmental

Operating Temperature: 0°C to +50°C
Storage Temperature: -40°C to +85 C
Humidity : 0-95% Non-condensing
Materials: U.L. approved

Approvals: CE Compliant, UL/CUL Listed

Display

Type: 2 lines of 20 characters, Backlit LCD, OLED or VFD
Character Size: 0.2" nominal
User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad with 16 keys
Keypad Rating: Sealed to NEMA 4X / IP65

Enclosure

Size: See Dimensions
Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Fluid Types

General Purpose, Water, Skydraul 500B, 50/50 Ethylene, Air, Propane, MIL-C-7024D, MIL-O-5606, MIL-23699, JETA-1, Diesel, Methanol

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Real Time Clock

The ES-747 is equipped with a battery backed real time clock with display of time and date.
Format:
    12 or 24 hour time display
    Day, Month, Year date display

Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected with self resetting fuse)

Relay Outputs

The relay outputs are menu assignable to (Individually for each relay) Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm, Temperature, Pressure, Density or General purpose warning (security).
Number of relays: 2 (4 optional)
Contact Style: Form C contacts
Contact Ratings: 5 amp, 240 VAC or 30 VDC
Capabilities: Alarm Delay, Setpoint, Hysteresis, Duration

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.
110 VAC Power: 85 to 127 Vrms, 50/60 Hz
220 VAC Power: 170 to 276 Vrms, 50/60 Hz
DC Power:
    12 VDC (10 to 14 VDC)
    24 VDC (14 to 28 VDC)
Power Consumption:
    AC: 11.0 VA (11W)
    DC: 300 mA max.

Flow Inputs:
Pulse Inputs:

Number of Flow Inputs: one input available for single pickup or with dual pickups or quadrature
Input Impedance: 10 KΩ nominal
Pullup Resistance: 10 KΩ to 5 VDC (menu selectable)
Pull Down Resistance: 10 KΩ to common
Trigger Level: (menu selectable)
    High Level Input
        Logic On: 3 to 30 VDC
        Logic Off: 0 to 1 VDC
    Low Level Input (mag pickup)
        Sensitivity:
            10 mV or 100 mV
Minimum Count Speed:
        Menu selectable: 1-99 seconds
Maximum Count Speed:
        Menu Selectable: 40Hz, 3000Hz or 20 kHz
Overvoltage Protection: 50 VDC

Control Inputs

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.
Control Input Specifications
Number of Control Inputs: 3
Input Scan Rate: 10 scans per second
Logic 1: 4 - 30 VDC
Logic 0: 0 - 0.8 VDC
Input Impedance: 100 KΩ
Control Activation:
    Positive Edge or Pos. Level based on product definition for switch usage.

Auxiliary / Compensation Inputs

The auxiliary/compensation inputs are menu selectable for temperature, pressure, density or not used. These inputs are used for the compensated inputs when performing compensated flow calculations. They can also be used as a general purpose input for display and alarming.
Number of inputs: 2
Operation: Ratiometric
Accuracy: 0.02% FS at 20° C
Basic Measurement Resolution: 16 bit
Update Rate: 1 update/sec minimum
Automatic Fault detection:
    Signal Over-range/under-range
    Current Loop Broken
    RTD short
    RTD open
    Fault mode to user defined default settings
Fault Protection:
    Reverse Polarity: No ill effects
    Over-Voltage Limit (Voltage Input): 50 VDC
Available Input Ranges
    Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC
    Current: 4-20 mA, 0-20 mA
    Resistance: 100 Ohms DIN RTD
                    Proprietary Thermistor
100 Ohm DIN RTD (liquid equations only)
(DIN 43-760, BS 1904):
    Three Wire Lead Compensation
    Internal RTD linearization learns ice point resistance
    1 mA Excitation current with reverse polarity protection
    Temperature Resolution: 0.1°C

Isolated Analog Output

The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Pressure, Density, Volume Total, Corrected Volume Total or Mass Total.
Type: Isolated Current Sourcing
Available Ranges: 4-20 mA, 0-20 mA
Resolution: 12 bit
Accuracy: 0.05% FS at 20° C
Update Rate: 1 update/sec minimum
Temperature Drift: Less than 200 ppm/C
Maximum Load: 1000 ohms (at nominal line voltage)
Compliance Effect: Less than .05% Span
60 Hz rejection: 40 dB minimum
Calibration: Operator assisted Learn Mode
Averaging: User entry of damping constant to cause a smooth control action

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total
Pulse Output Form: Photo MOS Relay
Maximum On Current: 100 mA
Maximum Off Voltage: 30 VDC
Saturation Voltage: 1.0 VDC
Maximum Off Current: 0.1 mA
Pulse Duration: 10 mSec or 100 mSec (user selectable)
Pulse output buffer: 256
Fault Protection
        Reverse polarity: Shunt Diode

Serial Communication

The serial port can be used for printing, data recording, and/or communication with a computer.
RS-232:
    Device ID: 01-99
    Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
    Parity: None, Odd, Even
    Handshaking: None, Software, Hardware
    Print Setup: Configurable print list and formatting
RS-485: (optional 2nd COM port)
    Device ID: 01-247
    Baud Rates: 2400, 4800, 9600, 19200
    Parity: None, Odd, Even
    Protocol: Modbus RTU (Half Duplex)

Setup Diskette Capabilities

Capabilities include: View Live Results Configure unit, Upload and Download to unit, Load and Save to file, Print Setup,

Data Logging Capabilities

Capabilities:
        Permits unit to automatically gather data during use.
Data Log List:
        User selectable: includes process variables, totalizers, set points, time and date
Data Log Event Trigger:
        selectable: includes interval, time of day, front key, external contact, end of batch
Data Log Format:
        selectable: Printer format, Database CSV format
Data Transmission:
        Selectable: Output may be transmitted immediately or held in data log for later polling
Remote Request Capabilities include:
        Send data log, clear data log

External Modem Support Capabilities:

Compatibility: Hayes Compatible
Polling Capabilities:
        Answers incoming calls, responds to requests for information of action
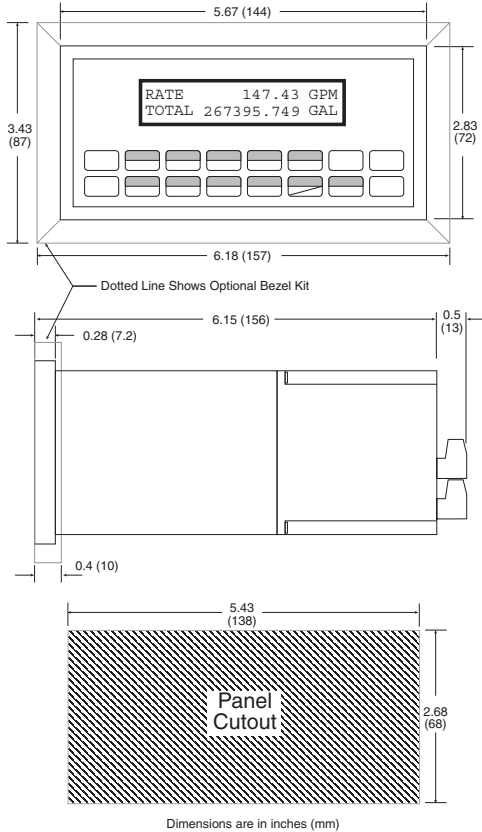Call Out Capabilities:
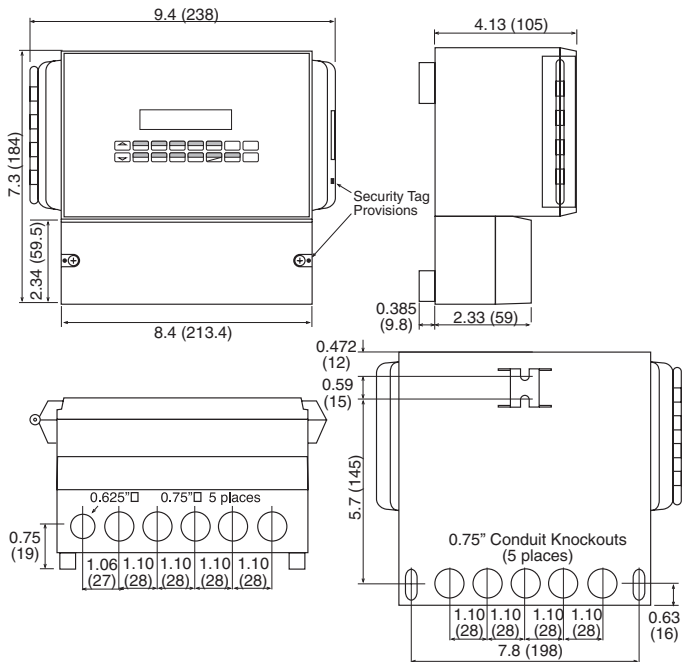   Can initiate call on user selectable event condition, or upon error
Error Handling:
        Supports multiple retry, automatic disconnect upon loss of line or remote inactivity

Flow Instruments
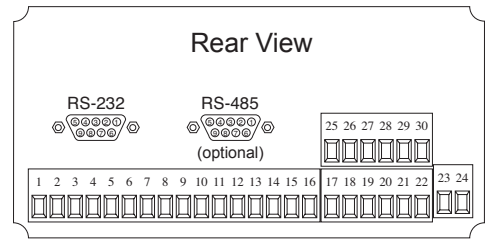FLOW COMPUTERS

Fig. 1: Standard Dimensions

RATE   147.43 GPM
TOTAL 267395.749 GAL

5.67 (144)
3.43 (87)
2.83 (72)
6.18 (157)

Dotted Line Shows Optional Bezel Kit

6.15 (156)
0.28 (7.2)
0.5 (13)
0.4 (10)

5.43 (138)
Panel Cutout
2.68 (68)

Dimensions are in inches (mm)

Fig. 2: Wall Mount ("W" mounting option) Dimensions

9.4 (238)
4.13 (105)
7.3 (184)
2.34 (59.5)
8.4 (213.4)
Security Tag Provisions
0.385 (9.8)
2.33 (59)

0.472 (12)
0.59 (15)
5.7 (145)
0.625"□   0.75"□ 5 places
0.75 (19)
1.06 (27) 1.10 (28) 1.10 (28) 1.10 (28) 1.10 (28)
0.75" Conduit Knockouts (5 places)
1.10 (28) 1.10 (28) 1.10 (28) 1.10 (28)
0.63 (16)
7.8 (198)

Terminal Designations

1	DC OUTPUT		FLOW IN
2	PULSE IN 1		
3	PULSE IN 2		
4	COMMON		
5	RTD EXCIT +	Vin +	Pressure
6	RTD SENS +	Thermistor	
7	RTD SENS -	Iin +	Temp. Pressure
8		Iin +	
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 +		4-20 mA
16	ANALOG OUTPUT -		
17	NC		NC
18	COM RLY1	25	COM RLY3
19	NO	26	NO
20	NC	27	
21	COM RLY2	28	NC
22	NO	29	COM RLY4
		30	NO
23	AC LINE	DC +	POWER IN
24	AC LINE	DC -	

Terminal Layout

Rear View

RS-232   RS-485
(optional)

25 26 27 28 29 30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16   17 18 19 20 21 22   23 24

Ordering Information

Example   ES747   L   1   A   0   P   TB

Series:
   ES747= ES-747

Display Type:
   L= LCD
   O= OLED
   V= VFD

Input Type:
   1= 110 VAC
   2= 220 VAC
   3= 12 VDC (10 to 14 VDC)
   4= 24 VDC (14 to 28 VDC)

Relays:
   A= 2 SPDT Relays
   B= 4 SPDT Relays

Network Card:
   0= None (STD)
   2= RS485/Modbus (optional 2nd COM port)

Mounting:
   P= Panel Mount .... (see Fig. 1)
   N= NEMA 4 Wall Mount .... (see MS811)
   W= NEMA 12/13 Wall Mount w/ Clear Cover .... (see Fig.2)
   E= Explosion Proof (No Button Access) .... (see XHVD 7/4)

Options:
   TB= RS485 Terminal Block for Panel Mount Enclosure
   ET= Extended Tempertaure
      -4°F to 131°F (-20°C to 55°C)
   IM = Internal Modem
   M = Modem Power Option

Accessories:
OPC/DDE Server for RS232 Port available, see EX5-UCOND-NA00
OPC/DDE Server for Modbus Suite available, see EX5-MDBUS-NA00
Modem Available, see MPP-2400N
Serial printer available, see P1000, P295
Ethernet Port Server available, see IEPS
Ethernet Port Server Modbus TCP available, see ADAM4572
RS-422/485 to RS-232 Communication Adapter available, see CA285
RS232 Extender Cable: P/N=13220-<length in inches>