

ES-761

- Computes New Energy Flowmeter And Temperature Or Pressure On Saturated Steam Input Temperature On Condensate Return Output
- Use Any Flow Meter Type- Menu Selectable
- Isolated Pulse, Analog, And Relay Outputs
- Built In Data-Logger Accessible From Standard RS232
- Optional RS485 Modbus RTU Communication Port
- Windows Setup Software
- Easily Configurable Through Keypad
- Remote Metering Supported
- Enhanced Features Include Stacked DP Transmitters, Peak Demand

Description of Enhanced Capabilities

Many of today's flow meters offer multiple outputs which are assignable to flow and temperature. The ES761ST2 offers enhanced functionality to permit these multiple outputs to be used with added flexibility. This flexibility is utilized in common applications such as when computing the net energy of saturated steam energy in minus condensate return energy out. Flow and Temperature can be measured at the multi-variable flow meter. A separate temperature measurement can be made in the condensate. The ES761 then computes the mass flow of steam as well as the input energy of steam from the available input sensors on steam, will also compute, the energy in the condensate return, and will compute the net energy. Refer to diagram which follows.

Addition Capabilities

1. Increased uses for compensation input 2
2. Increase variety of new flow meter types including verabar, accelebar, and mass flow meters.
3. Increased variety of selections on:
 - Display Scroll List
 - Print List
 - Current Outputs
 - Relay Outputs
 - RS232 Interface
 - RS485 Interface

The ES761 preserves the core functionality offered by the Supertrol-2 family including the ES749 which can be summarized as follows: The ES761ST2 Flow Computer satisfies the instrument requirements for a variety of flowmeter types in liquid, gas, steam and heat applications. Multiple flow equations are available in a single instrument with many advanced features.

The alphanumeric display offers measured parameters in easy to understand format. Manual access to measurements and display scrolling is supported.

Net Energy Flow Computer for Saturated Steam Energy & Condensate Return Energy



- Offers Full Line Of Other Flow Computations Supported As Standard
- DDE Server & HMI Software Available
- Remote Metering by Wireless or Modem

The versatility of the Flow Computer permits a wide measure of applications 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 the volume flow, corrected volume flow, mass flow, heat 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 logging, or transaction printing, or for connection to a modem for remote meter reading.

A PC Compatible software program is available which permits the user to rapidly redefine the instrument configuration.

NX-19

Advanced Natural Gas calculations where the user requires compensation for compressibility effects. Compensation for these compressibility effects are required at medium to high pressure and are a function of the gas specific gravity, % CO₂, % Nitrogen, as well as temperature and pressure. The compressibility algorithm used is that for NX-19.

Stacked differential pressure transmitter

This feature permits the use of a low range and high range DP transmitter on a single primary element to improve flow transducer and measurement accuracy.

Peak demand

This feature permits the determination of an hourly averaged flow rate. Demand last hour, peak demand and time/date stamping for applications involving premium billing.

Data logging

This feature provides data storage information in 64k of battery backed RAM. Items to be logged, conditions to initiate the log and a variety of utilities to clear and access the data via the RS-232 port are provided.

EZ Setup

The unit has a special EZ setup feature where the user is guided through a minimum number of steps to rapidly configure the instrument for the intended use. The EZ setup prepares a series of questions based on flow equation, fluid, and flowmeter type desired in the application.

1.2 Specifications:

Environmental

Operating Temperature: 0 to +50°C (std)
Storage Temperature: -40 to +85°C
Humidity : 0-95% Non-condensing

Approvals: CE Approved Light Industrial

Display

Type: 2 lines of 20 characters
Types: Backlit LCD, OLED and VFD options, 0.2" characters
User selectable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad, 16 Raised Keys
Keypad Rating: Sealed to NEMA 4X / IP65

Enclosure

Enclosure Options: Panel, Wall, Explosion Proof
Size: See Case Dimensions

NX-19 Compressibility Calculations

Temperature	-40 to 240 F
Pressure	0 to 5000 psi
Specific Gravity	0.554 to 1.0
Mole % CO2	0 to 15%
Mole % Nitrogen	0 to 15%

Power Input

The factory equipped power options are internally fused. An internal line to line filter capacitor is provided for added transient suppression. MOV protection for surge transient is also supported

Universal AC Power Option:

85 to 276 Vrms, 50/60 Hz
Fuse: Time Delay Fuse, 250V, 500mA

DC Power Option:

24 VDC (16 to 48 VDC)
Fuse: Time Delay Fuse, 250V, 1.5A

Flow Inputs:

Flowmeter Types Supported:

Linear:

Vortex, Turbine, Positive Displacement, Magnetic, GilFlo, GilFlo 16 point, ILVA 16 Point, Mass Flow and others

Square Law:

Orifice, Venturi, Nozzle, V-Cone, Wedge, Averaging Pitot, Target, Verabar, Accelabar and others

Multi-Point Linearization:

May be used with all flowmeter types. Including: 16 point, UVC and dynamic compensation.

Analog Input:

Accuracy: 0.02% FS at 20° C
Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Basic Measurement Resolution: 16 bit

Update Rate: 2 updates/sec minimum

Automatic Fault detection

Calibration: Operator assisted learn mode.
Learns Zero and Full Scale of each range

Optional: Stacked DP transmitter 0-20 mA or 4-20 mA

Pulse Inputs:

Number of Flow Inputs: one

Input Impedance: 10 kΩ nominal

Trigger Level: (menu selectable)

Minimum Count Speed: 0.25 Hz

Maximum Count Speed: Selectable: 0 to 40 kHz

Temperature, Pressure, Density Inputs

The compensation inputs usage are menu selectable for temperature, temperature 2, pressure, density, steam trap monitor or not used.

Calibration: Operator assisted learn mode

Accuracy: 0.02% FS

Thermal Drift: Less than 100 ppm/C

Basic Measurement Resolution: 16 bit

Update Rate: 2 updates/sec minimum

Automatic Fault detection:

Available Input Ranges

(Temperature / Pressure / Density / Trap Monitor)

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD, 3 Wire

100 Ohm DIN RTD (DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

Temperature Resolution: 0.1°C, Accuracy ± 0.5°C

Datalogger

Type: Battery Backed RAM

Size: 64k

Initiate: Key, Interval or Time of Day

Items Included: Selectable List

Data Format: Printer or CSV Access via RS-232 command

Stored Information (ROM)

Steam Tables (saturated & superheated), General Fluid Properties, Properties of Water, Properties of Air, Natural Gas

User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types

Fluid Properties

(specific gravity, expansion factor, specific heat, viscosity, isentropic exponent, combustion heating value, Z factor, Relative Humidity)

Units Selections (English/Metric)

RS-232 Communication

Uses: Printing, Setup, Modem, Datalogging

Baud Rates: 300, 1200, 2400, 9600

Parity: None, Odd, Even

Device ID: 0 to 99

Protocol: Proprietary, Contact factory for more information

Chassis Connector Style: DB 9 Female connector

RS-485 Communication (optional)

Uses: Network Communications
Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
Parity: None, Odd, Even
Device ID: 1 to 247
Protocol: ModBus RTU

Excitation Voltage

24 VDC @ 100 mA overcurrent protected

Relay Outputs

The relay outputs usage is menu assignable to (Individually for each relay) Hi/Lo Flow Rate Alarm, Hi/Lo Temperature Alarm, Hi/Lo Pressure Alarm, Pulse Output (pulse options), Wet Steam or General purpose warning (security).
(Peak demand and demand last hour optional)

Number of relays: 2 (3 optional)
Contact Style: Form C contacts (Form A with 3 relay option)
Contact Ratings: 240 V, 1 amp

Analog Outputs

The analog output usage is menu assignable to correspond to the Heat Rate, Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, or Pressure.
(Peak demand and demand last hour optional)

Number of Outputs: 2
Type: Isolated Current Sourcing (shared common)
Isolated I/P/C: 500 V
Available Ranges: 0-20 mA, 4-20 mA (menu selectable)

Resolution: 16 bit
Accuracy: 0.05% FS at 20 Degrees C
Update Rate: 5 updates/sec
Temperature Drift: Less than 200 ppm/C
Maximum Load: 1000 ohms
Calibration: Operator assisted Learn Mode
Averaging: User entry of DSP Averaging constant to cause a smooth control action

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.
Isolation I/O/P: 500 V
Pulse Output Form (menu selectable): Open Collector NPN or 24 VDC voltage pulse
Nominal On Voltage: 24 VDC
Maximum Sink Current: 25 mA
Maximum Source Current: 25 mA
Maximum Off Voltage: 30 VDC
Saturation Voltage: 0.4 VDC
Pulse Duration: User selectable
Pulse output buffer: 8 bit

Real Time Clock

The Flow Computer is equipped with a battery backed real time clock with display of time and date.
Format:
24 hour format for time
Day, Month, Year format for date
Daylight Savings Time (optional)

Saturated Steam Delta Heat

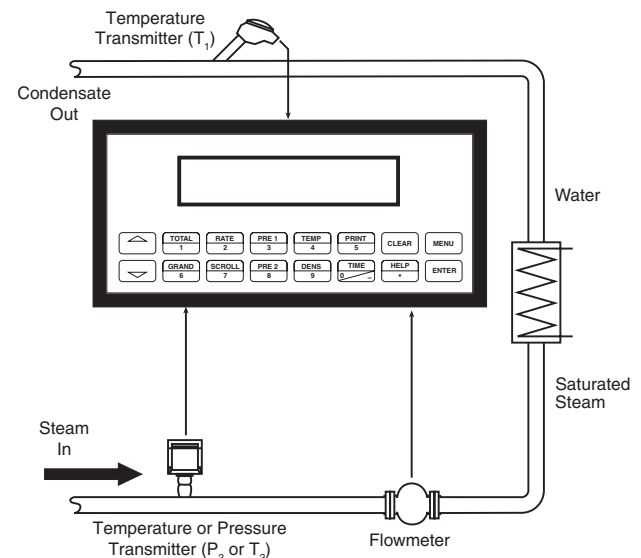
Measurements:

Measures actual volume flow and pressure of the saturated steam in the supply piping as well as the temperature of the condensate in the downstream piping of a heat exchanger.

Calculations:

- Calculates density, mass flow as well as the delta heat between the saturated steam (supply) and condensation (return) using physical characteristic tables of steam and water stored in the flow computer.
- With square law device measurement the actual volume is calculated from the differential pressure, taking into account temperature and pressure compensation.
- The saturated steam properties in the supply line is calculated from the pressure (or temperature) measured there.

Steam Delta Heat Illustration



Calculations

Delta Heat Flow

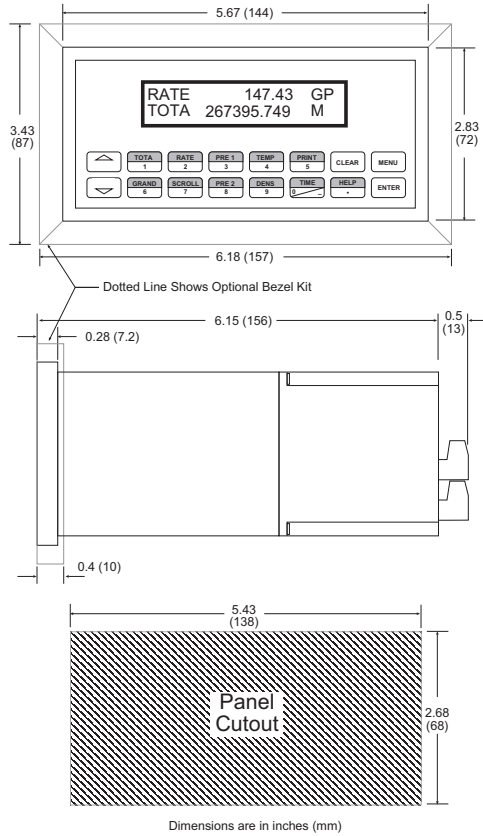
$$\text{Net Heat Flow} = \text{Volume flow} \cdot \text{density} (P_2 \text{ or } T_2) \cdot [E_D (P_2 \text{ or } T_2) - E_w (T_1)]$$

E_D = Specific enthalpy of steam implied by either T_2 or P_2

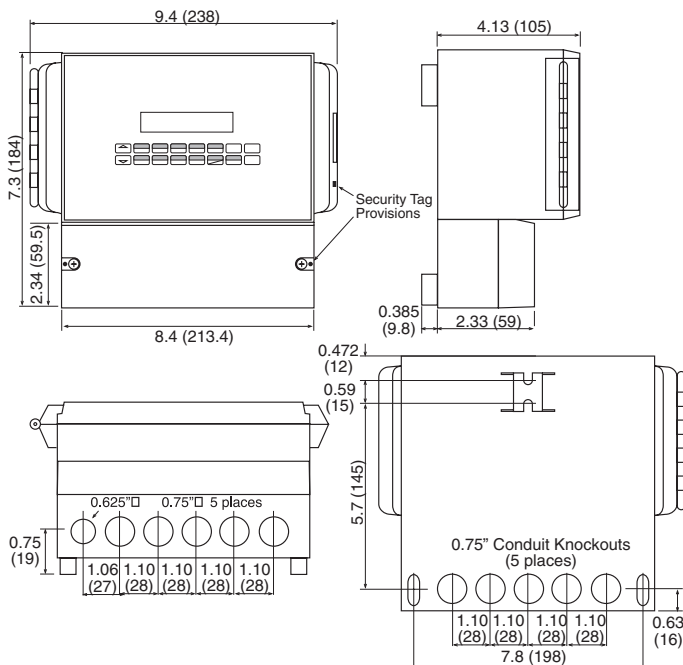
E_w = Specific enthalpy of water implied by T_1

Note: Assumes a closed system.

Dimensions



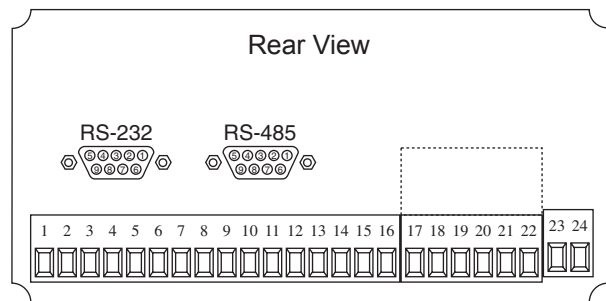
Wall Mount (option W)



Terminal Designations

1	DC OUTPUT PULSE IN	2	Vin (+)	3	lin (+)	4	COMMON	5	RTD EXCIT (+)	6	RTD SENS (+)	7	RTD SENS (-)	8	DC OUTPUT	9	RTD EXCIT (+)	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	24	AC LINE	DC (+)	POWER IN	DC (-)
---	--------------------	---	---------	---	---------	---	--------	---	---------------	---	--------------	---	--------------	---	-----------	---	---------------	----	--------------	----	--------------	----	------------------	----	------------------	----	---------------------	----	---------------------	----	--------------------------	----	----	----	----------	----	----	----	----	----	----------	----	----	----	---------	----	---------	--------	----------	--------

Terminal Layout



Ordering Information

Example ES761ST2 L 1 0 P 3

Series: _____

ST2 = Flow Computer

Display Type: _____

L = LCD

O = OLED

V = VFD

Input Type: _____

1 = 85 to 276 VAC

3 = 24 VDC

Network Card: _____

0 = None

1 = RS-485/Modbus

Mounting: _____

P = Panel Mount

N = NEMA 4 Wall Mount

W = NEMA 12/13 Wall Mount w/ Clear Cover

E = Explosion Proof (No Button Access)

Options: _____

3 = Three Relays

TB = RS485 Terminal Block for Panel Mount Enclosure

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-56KN and 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>