ST1 NET FC

Net Rate/Total Flow Computer for Liquid Applications

Features

- Displays Supply, Return and Net Rate/Total
- Supports Pulse Producing Flowmeters Turbine, Positive Displacement, Coriolis
- Volume, Corrected Volume or Mass Equation
- Universal Viscosity Curve (UVC) and Strouhal/ Roshko Advanced Linearization Methods
- API 2540 Equations for Petroleum Fluids
- User Entry of Fluid Properties (10 Selectable)
- Menu Selectable Hardware & Software Features
- Data Logging of Net Rate/Total
- Two Line LCD, OLED or VFD Display
- Isolated Pulse and Analog Outputs Standard

- RS-232 Port Standard, RS-485 Optional
- Auxiliary Energy Totalizer Available on Special Order
- Windows™ Setup Software
- DDE Server & HMI Software Available

Net Liquid Application

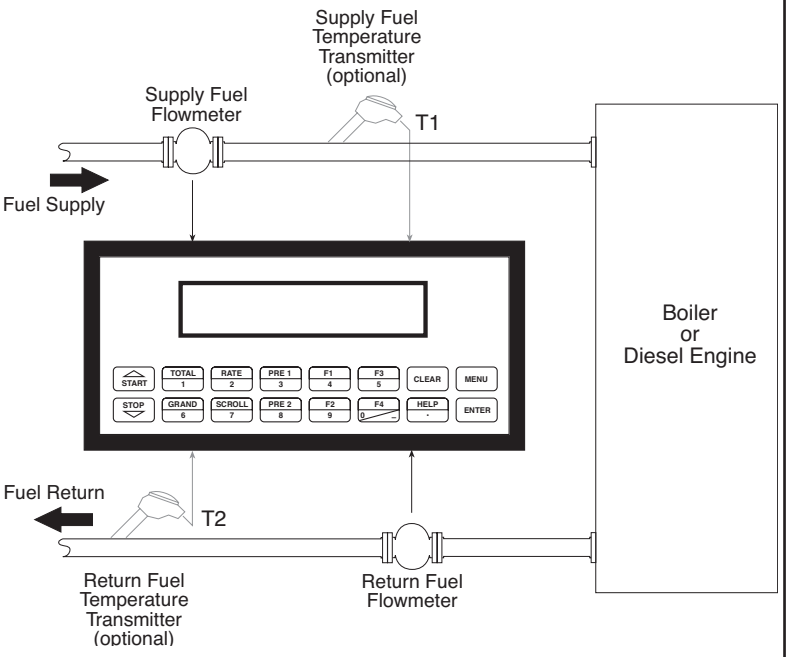
Measurements:
Flowmeter sensors measure the actual flow in the supply and return liquid lines. A temperature sensor can also be installed to correct for UVC or STRO linearization of turbine flowmeters.

Calculations:
- Supply and return flow is calculated using the flowmeter frequency output and the user entered K-Factor.
  Net Flow = Supply Flow – Return Flow

NOTE: Additional calculations are used for Corrected Volume and Mass applications

Output Results:
- Display Results
  Supply, Return, Net Flow Rates, Resettable Totals, Non-Resettable Totals
- Analog Output
  Net Rate or Net Total
- Pulse Output
  Net Total
- Relay Outputs
  Net Rate or Net Total Alarms

Applications:
The Flow Computer can monitor actual net flow and total of any liquid. (Common applications include boiler and diesel engine fuel consumption measurement) Flow alarms are provided via relays and datalogging is available via analog (4-20mA) and serial outputs.



Calculations
Pulse Input; Average K-Factor

$$\text{Supply or Return Flow} = \frac{\text{input frequency} \cdot \text{time scale factor}}{\text{K-Factor}}$$

Net Flow = Supply Flow – Return Flow

Specifications:

Flow Meters and Computations

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

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, User entry of fluid properties for up to 10 fluids.

Real Time Clock

The ST1-NET-FC 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 (net rate or net total), Hi Rate Alarm (net rate or net total), Temperature, 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: 2, one for supply and one for return
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 Reset, Lock, Inhibit, Alarm Acknowledge, Print, Aux. Energy Total input 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 supply temperature, return temperature 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
Fault mode to user defined default settings

Fault Protection:
Reverse Polarity: No ill effects
Over-Voltage Limit (Voltage Input): 50 VDC

Available Input Ranges
Current (Two): 4-20 mA, 0-20 mA
RTD: (One) 100 Ohm DIN RTD Standard Three Wire
Thermistor (One) - Consult Factory

Isolated Analog Output

The analog output is menu assignable to correspond to the Net Rate/Total, Supply Temperature, Supply Density.
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 Net 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,

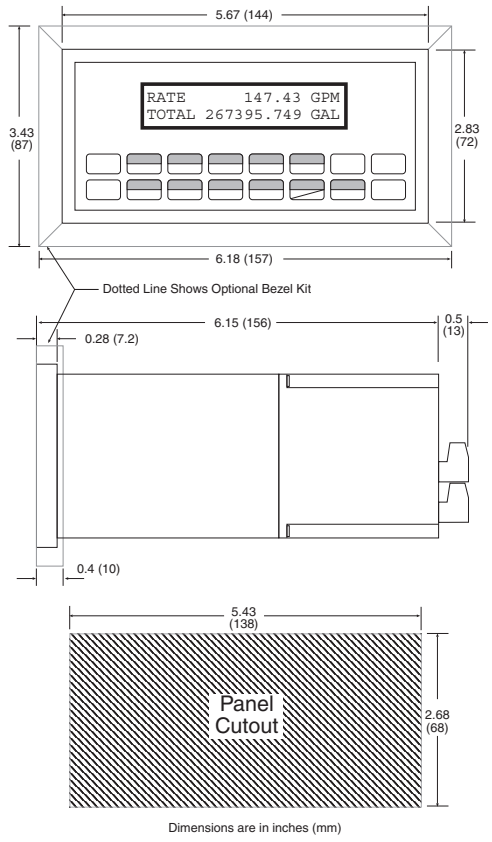
Data Logging Capabilities

Capabilities:
Permits unit to automatically gather data during use.
Data Log List:
User selectable: includes Supply/Return Temperatures, Supply/Return Density, Supply/Return Viscosity, Supply, Return and Net Ratemeters/Totalizers, Grand Totalizer, Time and Date, Fluid, Setpoint 1 & 2, Frequency 1 & 2, K-Factor 1 & 2.
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:

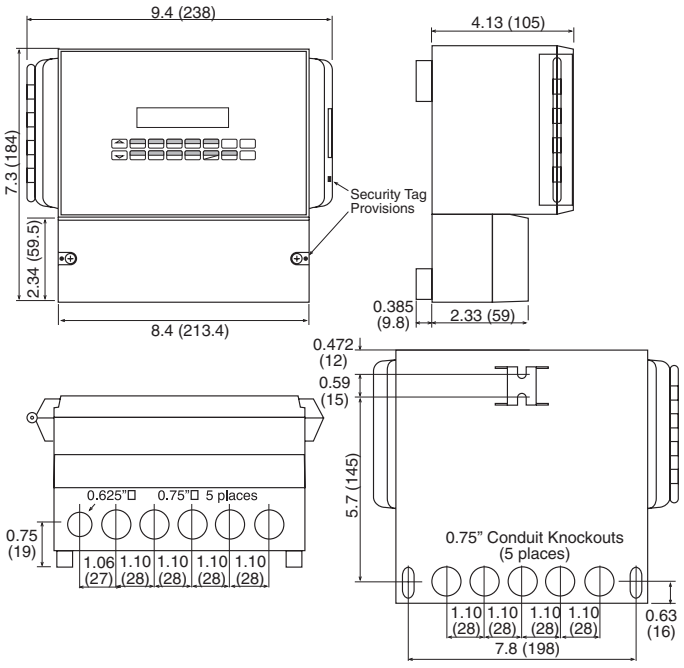
Compatibility: Hayes Compatible
Polling Capabilities:
Answers incoming calls, responds to requests for information of action
Call Out Capabilities:
Can initiate call on user selectable event condition, or upon error
Error Handling:
Supports multiple retry, automatic disconnect upon loss of line or remote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

Fig. 1: Standard Dimensions



Dimensions are in inches (mm)

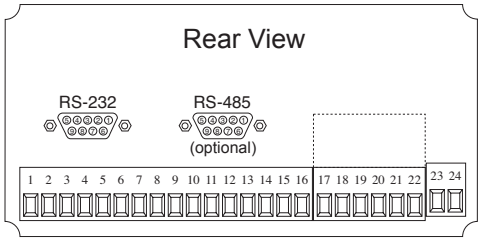
Fig. 2: Wall Mount ("W" mounting option) Dimensions



Terminal Designations

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

Terminal Layout



Ordering Information

Example ST1NETFC L 1 A 0 P TB

Series:

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 (optional)

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 NEMAtrolST4X)
- 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-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>