SIEMENS

SUGGESTED SPECIFICATION SITRANS FUE1010

Portable Multifunction Clamp-On
Single Channel Transit-Time Flowmeter

The furnished energy flowmeter shall be of a portable clamp-on design with fully integrated energy/BTU calculation utilizing precision matched 1000ohm platinum RTD pairs to within 0.02 °F and four wire temperature cable directly linked to the energy flowmeter. In addition, the flowmeter shall be digital microprocessor based utilizing both the Transit-Time flow measuring technique employing a multiple
pulse type signal in conjunction with multiple frequency transmission & axial beam transducer technology and Doppler Fourier (Reflexor mode) to insure operation on liquids with and without solids and or bubbles. Wetted flow transducers or electrodes, or flow and temperature measuring techniques other than previously described will not be acceptable.

The energy meter shall provide automatic transducer spacing, automatic Reynold's Number and liquid sonic velocity variation compensation and live zero flow measurement. The energy meter shall have the ability to indicate energy/BTU rate, volumetric flowrate, flow velocity, total energy, total flow, supply temperature, return temperature, differential temperature, signal strength, liquid sonic velocity, liquid
aeration/cavitation and Reynolds Number.

The energy meter shall have internal memory of at least 1 megabyte for datalogging purposes and the ability to store application data for over 50 separate sites. Downloading datalogger information to PC's will not require proprietary software but instead will utilize standard "off-the-shelf" software like
Windows Terminal program and will allow bi-directional digital communication with full control from the PC. In addition, the energy meter shall provide self and application diagnostics to isolate any fault conditions due to either equipment failure or abnormal process conditions.
The energy meter electronics shall be powered by 90-240 VAC, 50/60 Hz with an internal battery. The system will provide two isolated 4 to 20 MADC outputs and two 0 to 10 volt outputs assignable to energy/BTU rate, flowrate, velocity, supply temperature, return temperature, liquid sonic velocity, signal strength or liquid aeration/cavitation well as TTL level alarm outputs, RS-232 digital output and separate test port for diagnostic & calibration functions.

The energy meter shall have an accuracy of 1 to 2% of flow over a ±40 fps flow range. Accuracy can be improved to ±0.1 to 1% of flow with wet flow calibration via weigh tank method. Repeatability shall be 0.15% of flow with a flow sensitivity of 0.001 fps at any flowrate including no flow conditions. Time measurement resolution shall be in picoseconds to assure proper measurements at low flows. Nanosecond resolution will not be acceptable.

The energy meter shall also possess the following capabilities:

- Cavitation and Aeration Detection
- Pipe Wall Thickness Measurement Gauge
- Reflexor Operation (Doppler) Mode for Non-Homogenous Liquids with
  high reflective solids content or extreme aeration.

- FFT Fast Fourier Transform frequency spectrum analysis of signals during doppler mode.
- Security password protection for individual sites.
- Pipe simulator for system integrity and calibration check out
- External Analog Inputs for 4-20mA and 0-10Vdc to accommodate other parameters (KW, psi, etc..) for inclusion into the internal datalogger.
- Reverse Flow and Empty Pipe Detection
- Direct Digital Temperature measurement via matched 1000ohm Platinum RTD pair and Four-wire cable connection
- Certified for CE Mark
- Internal Quick/Rapid charging Battery
- Wide choice of Large Multi-graph Data Display Screens including Onscreen Help Menu
- Built-in signal shape coherence diagnostic test graph to verify integrity of installation & assure properly matched transducers for application conditions.

The furnished energy meter shall be FUE1010 IP 40 (NEMA 1)   as manufactured by Siemens of Hauppauge, N.Y. (1-800-275-8479; www.sea.siemens.com/ia) or approved equal. Approval for a flowmeter, other than the specified flowmeter, will be given if the proposed flowmeter meets the specifications as established by the above and upon an actual demonstration of the equipment on the intended application.

FUE1010ENERGYSPEC

SIEMENS

SUGGESTED SPECIFICATION SITRANS FUE1010

Dedicated Multifunction Clamp-On
Dual Channel Transit-Time Flowmeter

The furnished energy flowmeter shall be of a clamp-on design with fully integrated energy/BTU calculation utilizing precision matched 1000 Ohm platinum RTD pairs to within 0.02 °F and four-wire temperature cable directly linked to the energy flowmeter. In addition, the flowmeter shall be digital microprocessor based utilizing both the Transit-Time flow measuring technique employing a multiple pulse type signal in conjunction with multiple frequency transmission & axial beam transducer technology and Doppler Fourier (Reflexor mode) to insure operation on liquids with and without solids and or bubbles. Wetted flow transducers or electrodes, or flow and temperature measuring techniques other than previously described will not be acceptable.

The energy meter must use Hi-precision transducers, frequency matched to the pipe material and wall thickness utilizing the pipe wall as a waveguide and creating a coherent widebeam transmission into the liquid. Shear mode or narrow beam transducers will not be acceptable.

The energy meter shall provide automatic transducer spacing, automatic Reynold's Number and liquid sonic velocity variation compensation and live zero flow measurement. The energy meter shall have the ability to indicate energy/BTU rate, volumetric flowrate, flow velocity, total energy, total flow, supply temperature, return temperature, differential temperature, signal strength, liquid sonic velocity, liquid aeration/cavitation and Reynolds Number.

The energy meter shall have internal memory of at least 1 megabyte for datalogging purposes and the ability to store application data for over 50 separate sites. Downloading datalogger information to PC's will not require proprietary software but instead will utilize standard "off-the-shelf" software like Windows Terminal program and will allow bi-directional digital communication with full control from the PC. In addition, the energy meter shall provide self and application diagnostics to isolate any fault conditions due to either equipment failure or abnormal process conditions.

The energy meter electronics shall be powered by 90-240 VAC, 50/60 Hz. The system will provide two isolated 4 to 20 MADC outputs and two 0 to 10 volt outputs assignable to energy/BTU rate, flowrate, velocity, supply temperature, return temperature, liquid sonic velocity, signal strength or liquid aeration/cavitation well as TTL level alarm outputs, RS-232 digital output and separate test port for diagnostic & calibration functions.

The energy meter shall have an accuracy of .5 to 1% of flow over a ±40 fps flow range. Accuracy can be improved to ±0.1 to 1% of flow (depending on application) with wet flow calibration via weigh tank method. Repeatability shall be 0.15% of flow with a flow sensitivity of 0.001 fps at any flowrate including no flow conditions. Time measurement resolution shall be in picoseconds to assure proper measurements at low flows. Nanosecond resolution will not be acceptable.

The energy meter shall also possess the following capabilities:

- Cavitation and Aeration Detection
- Simultaneous Measurement (Dual Channel) of Two Separate Pipes
- Summing of the Flow of Two Separate Pipes
- Difference of the Flow of Two Separate Pipes
- Average of the Flow of Two Separate Pipes
- Dual Path Flow Measurement of One Pipe
- Reflexor Operation (Doppler) Mode for Non-Homogenous Liquids with high reflective solids content or extreme aeration.
- FFT Fast Fourier Transform frequency spectrum analysis of signals during doppler mode.
- Security password protection for individual sites.
- Pipe simulator for system integrity and calibration check out
- External Analog Inputs for 4-20mA and 0-10Vdc to accommodate other parameters (KW, PSI, etc.) for inclusion into the internal datalogger.
- Reverse Flow and Empty Pipe Detection
- Direct Digital Temperature measurement via precision matched 1000 Ohm Platinum RTD pair and Four-wire cable connection
- Certified for CE Mark
- FM/CSA approved
- Mod Bus/ethernet interface module and built-in Modem option
- Built-in signal shape coherence diagnostic test graph to verify integrity of installation & assure properly matched transducers for application conditions.

The furnished energy meter shall be SITRANS FUE1010 IP 65 NEMA 4X as manufactured by Siemens of Hauppauge, N.Y. (1-800-275-8479; www.sea.siemens.com/ia) or approved equal. Approval for a flowmeter, other than the specified flowmeter, will be given if the proposed flowmeter meets the specifications as established by the above and upon an actual demonstration of the equipment on the intended application.

SIEMENS

SUGGESTED SPECIFICATION SITRANS FUE1010

Portable Ruggedized Multifunction Clamp-On
Dual Channel Transit-Time Flowmeter

The furnished energy flowmeter shall be of a dual channel portable ruggedized clamp-on design with fully integrated energy/BTU calculation utilizing precision matched 1000ohm platinum RTD pairs to within 0.02 °F and four wire temperature cable directly linked to the energy flowmeter. In addition, the flowmeter shall be digital microprocessor based utilizing both the Transit-Time flow measuring technique employing a multiple pulse type signal in conjunction with multiple frequency transmission & axial beam transducer technology and Doppler Fourier (Reflexor mode) to insure operation on liquids with and without solids and or bubbles. Wetted flow transducers or electrodes, or flow and temperature measuring techniques other than previously described will not be acceptable.

The energy meter shall provide automatic transducer spacing, automatic Reynolds Number and liquid sonic velocity variation compensation and live zero flow measurement. The energy meter shall have the ability to indicate energy/BTU rate, volumetric flowrate, flow velocity, total energy, total flow, supply temperature, return temperature, differential temperature, signal strength, liquid sonic velocity, liquid aeration/cavitation and Reynolds Number.

The energy meter shall have internal memory of at least 1 megabyte for datalogging purposes and the ability to store application data for over 50 separate sites. Downloading datalogger information to PC's will not require proprietary software but instead will utilize standard "off-the-shelf" software like Windows Terminal program and will allow bi-directional digital communication with full control from the PC. In addition, the energy meter shall provide self and application diagnostics to isolate any fault conditions due to either equipment failure or abnormal process conditions.

The energy meter electronics shall be powered by 90-240 VAC, 50/60 Hz with an internal battery. The system will provide two isolated 4 to 20 MADC outputs and two 0 to 10 volt outputs assignable to energy/BTU rate, flowrate, velocity, supply temperature, return temperature, liquid sonic velocity, signal strength or liquid aeration/cavitation well as TTL level alarm outputs, RS-232 digital output and separate test port for diagnostic & calibration functions.

The energy meter shall have an accuracy of ±1 to 2% of flow over a ±40 fps flow range. Accuracy can be improved to ±0.1 to 1% of flow with wet flow calibration via weigh tank method. Repeatability shall be 0.15% of flow with a flow sensitivity of 0.001 fps at any flowrate including no flow conditions. Time measurement resolution shall be in picoseconds to assure proper measurements at low flows.
Nanosecond resolution will not be acceptable.

The energy meter shall also possess the following capabilities:

- Cavitation and Aeration Detection
- Pipe Wall Thickness Measurement Gauge
- Simultaneous Measurement of Two Separate Pipes
- Reflexor Operation (Doppler) Mode for Non-Homogenous Liquids with

high reflective solids content or extreme aeration.

- FFT Fast Fourier Transform frequency spectrum analysis of signals during doppler mode.
- Security password protection for individual sites.
- Pipe simulator for system integrity and calibration check out
- External Analog Inputs for 4-20mA and 0-10Vdc to accommodate other parameters (KW, psi, etc..) for inclusion into the internal datalogger.
- Reverse Flow and Empty Pipe Detection
- Direct Digital Temperature measurement via matched 1000ohm Platinum RTD pair and Four-wire cable connection
- Certified for CE Mark
- Internal Quick/Rapid charging Battery
- Wide choice of Large Multi-graph Data Display Screens including Onscreen Help Menu
- Built-in signal shape coherence diagnostic test graph to verify integrity of installation & assure properly matched transducers for application conditions.

The furnished dual channel portable energy meter shall be SITRANS FUE IP 40 (NEMA 1) as manufactured by Siemens of Hauppauge, N.Y. (1-800-275-8479; www.sea.siemens.com/ia) or approved equal. Approval for a flowmeter, other than the specified flowmeter, will be given if the proposed flowmeter meets the specifications as established by the above and upon an actual demonstration of the equipment on the intended application.

FUE1010ENERGYSPEC