SAGE METERING, INC.

MASS FLOW METERS FOR GREENHOUSE GAS REDUCTION

GHG EMISSION OFFSETS

Inspired by the Kyoto Accord, an International Treaty that requires industrialized countries to reduce their collective greenhouse gas emissions, the global Greenhouse Gas (GHG) emissions trading industry was initiated to reduce greenhouse gas emissions that contribute to Global Warming. Ratification of the Kyoto Protocol has created demand for Certified Emission Reductions (CERs). The purchase of these CERs enables greenhouse gas emitters, including countries, power generators and other large commercial entities to offset their emissions for compliance or other individual circumstances.

The Kyoto Protocol created mechanisms, such as the Clean Development Mechanism (CDM), which provides local or international project developers working with developing countries such as China, Mexico, Brazil, etc., the opportunity to be involved in emission reduction projects that reduce greenhouse gases, as well as providing a means to quantify and sell the associated tradable credits (CERs or carbon credits). In addition to the well publicized Carbon Dioxide (CO_2) , for example, Methane is a natural but substantial by-product of livestock waste, yet it is a Greenhouse Gas that is 21 times more potent than CO_2. By capturing the Methane (via digesters furnished by a Global GHG Reduction company), and allowing natural anaerobic digestion to occur, bacteria converts this waste to 65% Methane and 35% CO_2 (typical mixture). And before it is flared or turned into electrical energy or pipeline gas, it must be measured to determine the CERs – ***and this is where the precision of the Sage Metering's NIST Traceable Digital Thermal Mass Flow Meter is required to ensure accurate measurement of this marketable commodity.***

Sage Metering, Inc. manufactures Thermal Mass Flow Meters (TMFM) of both an In-Line and Insertion variety with a unique digital-drive circuitry that results in extreme low-end sensitivity (suitable for the very low flows associated with Biogas, Digester Gas and Landfill Gas), wide rangeability, and direct mass flow. There is no need for temperature or pressure corrections. ***The Sage meters have high resistance to gas contaminants and virtually no annual maintenance, making them reliable and very easy to own and operate. In addition, the Flow Meter has negligible pressure drop (a critical feature for low gas flows).*** Sage Prime, its newest product, features a bright graphical display of Flow Rate, Totalized Flow (gas consumption) and Temperature, robust industrial enclosure, ease of installation, and ease-of-access to terminals. It draws very little power (under 2.4 watts) and is offered in 24 VDC or 115/230 VAC versions as well as 12 VDC versions for Solar Energy installations. In addition, for reassurance of normal operation and peace of mind, it displays the raw calibration signal for ongoing diagnostics and outputs a linear 4-20 ma signal proportional to Flow Rate as well as a non-resettable Pulsed Output of Totalized Flow.

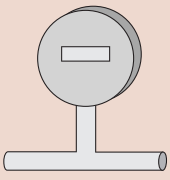
OTHER ENVIRONMENTAL APPLICATIONS

- CCX LANDFILL EMISSION OFFSETS
- LANDFILL GAS T0 ENERGY
- COMPLIANCE REQUIREMENTS FOR BOILERS, STEAM GENERATORS, AND PROCESS HEATERS

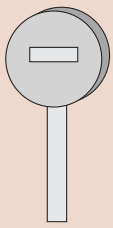
INTEGRAL

SIP Series

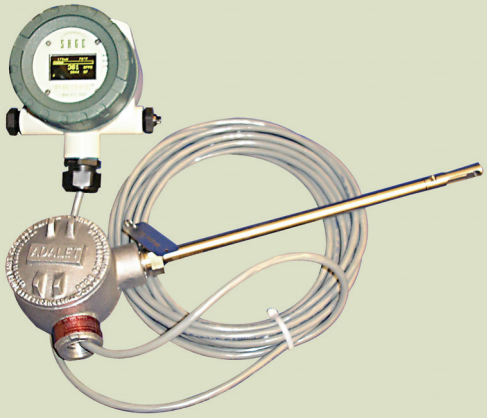
IN-LINE



INSERTION

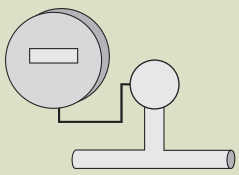


REMOTE



SRP Series[1]

IN-LINE



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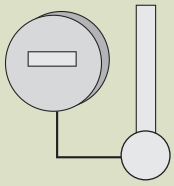

Flow Control Magazine
2006 Innovations Awards
WINNER

1 *On the Remote Styles, the Flow Element's Junction Box is Explosion Proof (Class 1, Div 1, Groups B, C, D), and does not have any electronics – only a wiring terminal block. The Flow Element will be connected to the Electronics by 25 feet of lead-length compensated cable. The cable (6-conductor) can be lengthened or shortened without affecting accuracy (max loop resistance 10 ohms, over 1000 feet).*

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GHG Rev. 3-0408

GREENHOUSE GAS REDUCTION

CCX LANDFILL METHANE EMISSION OFFSETS

In North America, the Chicago Climate Exchange (CCX) was established to offer a mechanism to reduce Global Warming emissions, and provide simple, standardized rules for issuing tradable greenhouse gas emission offsets for qualified projects. While not mandatory, the CCX does bring voluntary buyers and sellers together to trade credits. Eligible offset projects include Methane collection at Landfills and Livestock operations. Sage Metering can provide the precision needed to monitor the Flow Rate and Totalized Flow required to verify CCX tradable credits. ***Accurate measurement is key to securing the best return on investment for these Methane collection projects.***

LANDFILL GAS TO ENERGY

Instead of allowing Landfill Gas (LFG) to escape into the air, it can be captured and converted and used as an energy source. US Environmental Protection Agency (EPA) lists over 400 projects in the U.S. and over 1100 worldwide that generate electricity for on-site use or sale to the grid. Totalized flow measurement of the Landfill Gas is often required by Air Quality Management Districts or in the case of hybrid systems, where there is Landfill Gas recovery (for GHG reduction) as well as energy production, flow measurement will also be needed. Again, Sage Metering Flow Meters are the perfect solution for continuously monitoring the gas Mass Flow Rate and Output.

COMPLIANCE REQUIREMENTS FOR BOILERS, STEAM GENERATORS AND PROCESS HEATERS

Emissions from other sources, such as large industrial boilers, steam generators and process heaters generate a great deal of gaseous emissions (primarily NOx and CO). Many Air Quality Management Districts are regulating these devices to limit the associated air pollution, and health dangers. For example, the Sacramento Metropolitan (Sacramento, CA) AQMD instituted Rule 411 to limit the associated NOx and CO emissions from these devices. One requirement of the rule is to continuously monitor each fuel line's consumption with a temperature and pressure compensated flow meter that has a non-resettable totalizer. And the San Joaquin Valley (San Joaquin, CA) APCD's Rule 4702 requires measurement of fuel gas by non-resettable fuel meter. The Sage Prime Thermal Mass Flow Meter (for Natural Gas or gaseous fuels) is ideally suitable to satisfy this requirement.

SAGE PRIME MASS FLOW METERS

These applications are best served by the newest addition to our family of high performance Thermal Mass Flow Meters—Sage Prime.

Sage Prime™ is a thermal dispersion type of Flow Meter, utilizing the constant temperature difference method of measuring Gas Mass Flow Rate. It contains two reference grade platinum RTD sensors clad in a protective 316 SS sheath. It features direct Mass Flow for gases, wide rangeability, low pressure drop, very low end sensitivity, and no moving parts.

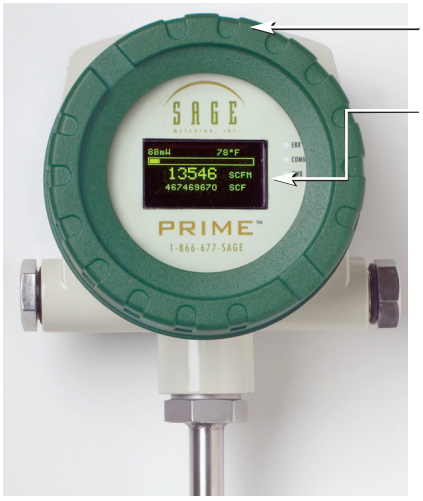
The Prime is microprocessor based, has digital drive circuit, and has Modbus® RS485 RTU communications. It is powered by 24 VDC (12 VDC optional, or 115/230 VAC). The power dissipation is under 2.5 watts (e.g. under 100 ma at 24 VDC) for the DC version. The power and output terminals are in a separate compartment for ease of installation.

The Sage Prime display is a high contrast photoemissive OLED display, and it displays Mass Flow Rate, Totalized Flow, and Temperature, as well as a graphical representation of Flow Rate in a horizontal bar graph format. In addition, the calibration milliwatts (mw) is continuously displayed, providing ongoing diagnostics. Outputs include a 4-20 mA signal (ground based) proportional to Mass Flow Rate, and pulsed Outputs of Totalized Flow (24VDC solid state [sourcing] transistor drive), as well as Modbus® compliant RS485 RTU communications.

Calibration is NIST traceable, and covers a wide variety of gas calibrations. Sage Prime™ can measure gas flow up to 500˚F (–40˚F to 350˚F standard, 500˚F optional) at pressures up to 500 PSIG (1000 PSIG, optional).

Accuracy is ±0.5% of Full Scale ±1% of reading with a turn-down of up to 1000 to 1. Higher accuracy available with lower turndown (contact Sage). Repeatability of 0.2%. The Flow Meter is Sage Metering, Inc. SIP Series (Integral Style) or SRP (Remote Style), with the trade name Sage Prime™.

For further information on "Sage Prime", please ask for the "Sage Prime" flyer; and for additional Sage products, ask for the Sage 8-page brochure, or refer to the Sage Metering website, www.sagemetering.com.



Dual-Sided Explosion Proof Enclosure, with large, easy-to-access terminals in rear compartment

Features a very high contrast display of Gas Flow Rate, Total and Temperature, visible even in bright sunlight

SAGE THERMAL MASS FLOW METER BENEFITS

- High Accuracy and Repeatability – Precision measurement of your Digestor Gas, Landfill Gas, Biogas, Methane or Natural Gas Flows
- Direct Mass Flow – No Need for Temperature and Pressure Corrections
- Rangeable over at least 100 to1 and as high as 1000 to 1
- Low-End Sensitivity – Can detect extremely low gas flows (i.e. under 1 SCFM in a 4" pipe)
- Negligible Pressure Drop – Will not impede the flow coming off of the Digester
- No Moving Parts – Eliminates costly maintenance such as replenishing oil, or bearing replacements
- Dirt Insensitive – Provides sustained performance
- Ease-of-Installation, and convenient mounting hardware
- Low Power dissipation (Sage Prime draws under 2.5 Watts)
- Options for Solar Energy use (12 VDC Models)
- High contrast graphical display, with Flow Rate, Total and Temperature
- Rugged, user friendly packaging with easy to access terminals
- Ongoing diagnostics
- Easy to configure for low flow or variable gas production