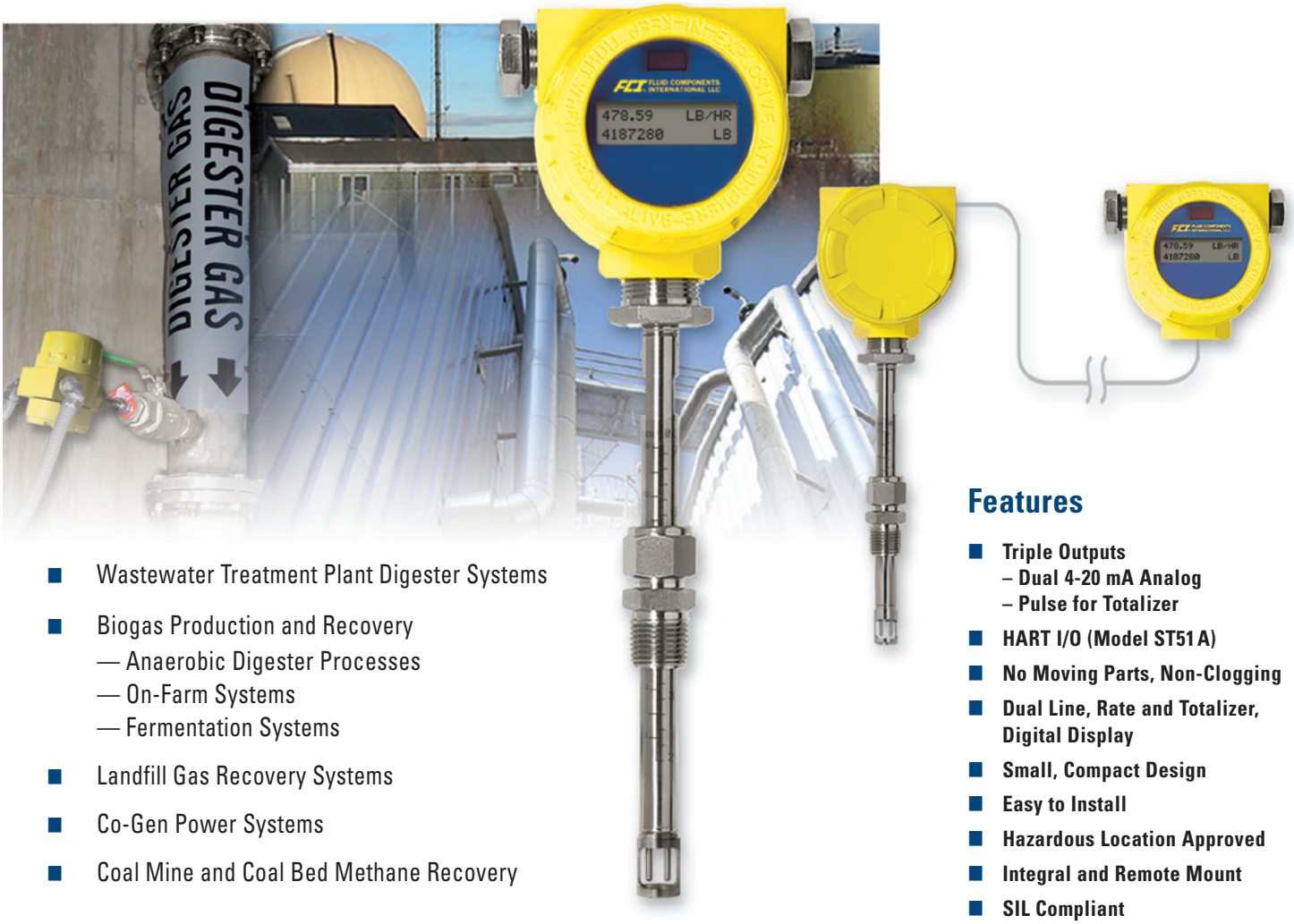
ST51 / ST51 A Mass Flow Meters

FLUID COMPONENTS INTERNATIONAL LLC

For Biogas, Digester Gas, Methane and Natural Gas



- Wastewater Treatment Plant Digester Systems
- Biogas Production and Recovery
  - — Anaerobic Digester Processes
  - — On-Farm Systems
  - — Fermentation Systems
- Landfill Gas Recovery Systems
- Co-Gen Power Systems
- Coal Mine and Coal Bed Methane Recovery

Features

- **Triple Outputs**
  - **– Dual 4-20 mA Analog**
  - **– Pulse for Totalizer**
- **HART I/O (Model ST51 A)**
- **No Moving Parts, Non-Clogging**
- **Dual Line, Rate and Totalizer, Digital Display**
- **Small, Compact Design**
- **Easy to Install**
- **Hazardous Location Approved**
- **Integral and Remote Mount**
- **SIL Compliant**

The ST51 Series Flow Meter is an accurate, easy to install, no moving parts solution for measuring and controlling biogases, digester gases, methane and natural gas flow. ST51 utilizes FCI proven thermal dispersion technology to provide direct mass flow measurement resulting in higher performance at a lower cost than orifice plates, DP, Vortex shedding and other thermal devices.

Biogas and digester gas applications are challenged by wide flow variations and dirty, wet gas. Flow variation is experienced as these processes move from low production start-up phases to a consistent, sustainable process and by seasonal temperature change, where cold temperatures slow gas production and higher temperature accelerate gas production. While the primary composition of these gases is methane and CO_2, residual H_2S and wet vapor leave deposits and corrode surfaces. ST51 provides the solution to these challenges. It features a wide-turndown ratio, up to 100:1 and is highly sensitive to low flow measurement. To measure correctly in fluctuating temperatures, flow meters must include temperature compensation circuitry and it is standard in ST51. ST51 has no moving parts to foul or clog and is easily pulled from the pipe for occasional cleaning.

ST51 installs in line sizes ranging from 2 inch to 24 inch [51 mm to 610 mm] with 1/2 inch or 3/4 inch NPT.

The ST51 uses precision, lithography structured platinum RTD sensors embedded in FCI's equal mass small diameter thermowells. Combined with microprocessor electronics and precision calibration, the ST51 achieves excellent accuracy, fast response and virtually maintenance free operation.

Biogas, digester gas and landfill gas compositions are dominated by methane (CH_4) and present a potentially hazardous installation environment. Sound engineering practice and often regulations mandate that instrumentation meet guidelines and have agency approvals for installation zone safety. Depending on actual installation location, at a minimum the environment will require Class I, Division II and often a more rigorous Class I, Division I [Zone 1 II2GD Ex d IIC] approvals. FCI ST51 meets all of these and has obtained the global agency approvals that ensure your installation is always safe and complies with regulations. And, unlike manufacturers who merely provide their transmitter electronics in an approved OEM enclosure, FCI submits its entire instrument to agency testing. FCI product approvals are different because they are comprehensive system approvals that also take into account the sensor and seal requirements as well the "T" (temperature) ratings. FCI agency approvals are on the total instrument. With ST51 you are assured of the integrity of total instrument approvals that meet or exceed safe engineering practice for your applications.

ST51 Specifications

Instrument

Media Compatibility: Biogas, digester gas, methane, natural gas, air, compressed air, nitrogen

Pipe/Line Size Compatibility: 2 ″ to 24 ″ [51 mm to 610 mm] [1]

Flow Range: 0.3 SFPS to 400 SFPS [0,08 MPS to 122 MPS]

Accuracy: (at ≥ 0.75 SFPS [≥ 0,21 NMPS] [2])

Standard: ±2% reading ±0.5% full scale

Optional: ±1% reading ±0.5% full scale

Repeatability: ±0.5% reading

Temperature Compensation

Standard: 40 °F to 100 °F [4 °C to 38 °C];

Optional: 0 °F to 350 °F [-18 °C to 177 °C]

Temperature Coefficient

With temperature compensation; valid from 10% to 100% of full scale calibration

Flow: Maximum ±0.015% of reading / °F up to 350 °F [±0.03% of reading / °C up to 177 °C]

Turndown Ratio: 3:1 to 100:1

Agency Approvals

FM, FMc: Class I, Division 1, Groups B, C, D; T4 Ta = 60°C
Class II/III, Division 1, Groups E, F, G; T4 Ta = 60°C; Type 4X/ IP66
Class I, Division 2, Groups A, B, C, D; T4 Ta = 60°C

ATEX, IECEx: Zone 1, Zone 21
II 2 G Ex db IIC T6...T1 Gb
II 2 D Ex tb IIIC T85°C... T300°C Db; IP66/IP67
Ta = -40°C to +65°C

Other: EAC (TRCU) Russia, CE Marking, CRN

SIL (ST51A): SIL 1 compliant; Safe Failure Fraction (SFF) 78.5% to 81.1%

Warranty: ST51 – 1 year; ST51 A – 2 years

[1] *For line sizes 2" [51 mm] or smaller, see FCI ST75 Series*

[2] *Contact FCI for accuracy below 0.75 SFPS [0,21 NMPS]*

Flow Element

Installation: Insertion, variable length with 1/2 ″ or 3/4 ″ MNPT compression fitting

Type: Thermal dispersion

Material of Construction: 316L stainless steel body with Hastelloy-C22 thermowell sensors, 316 stainless steel compression fitting with Teflon or stainless steel ferrule

Pressure (Maximum Operating without Damage)

Stainless steel ferrule: 500 psig [34 bar (g)]

Teflon ferrule: 150 psig [10 bar (g)]

Operating Temperature

Stainless steel ferrule

ST51: -0 °F to 250 °F [-18 °C to 121 °C]

ST51 A: -0 °F to 350 °F [-18 °C to 177 °C]

Teflon ferrule: -0 °F to 200 °F [-18 °C to 93 °C]

Process Connection: 1/2 ″ MNPT or 3/4 ″ MNPT with stainless steel or Teflon ferrule

Insertion Length (Field Adjustable)

1 ″ to 6 ″ [25 mm to 152 mm]

1 ″ to 12 ″ [25 mm to 305 mm]

1 ″ to 18 ″ [25 mm to 457 mm]

Flow Transmitter

Enclosure

Rating: NEMA 4X, IP67

Material: *Standard* – aluminum, polyester powdered coated
Optional – 316 stainless steel

Conduit/Cable Port: Dual 1/2 ″ NPT or M20x1.5

Operating Temperature: 0 °F to 140 °F [-18 °C to 60 °C]

Input Power

DC: 18 Vdc to 36 Vdc (6 watts max.)

AC: 85 Vac to 265 Vac (12 watts max.; CE Marking approval from 100 Vac to 240 Vac)

Analog Output Signals: Dual 4-20 mA, user assignable to flow rate and/or temperature and a 0-500 Hz pulse output for total flow; ST51A output #1 has fault indication per NAMUR NE43 guidelines, user selectable for high (>21.0 mA) or low (<3.6 mA)

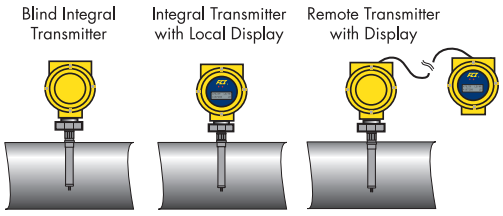
Bus Communications (ST51 A): HART (version 7); FieldComm Group certified; available over output #1; DD file included

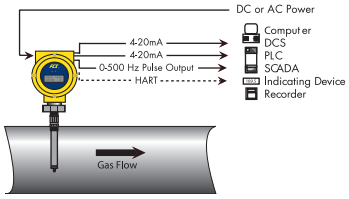
Communication Port: RS-232C

Digital Display (Optional): Two-line x 16 character LCD; displays measured value and engineering units; top line assigned to flow rate, second line user assignable to temperature reading, as flow totalizer or alternating; display can be rotated in 90° increments for optimum viewing orientation

Installation and Mounting: Integral with sensor element or remote mountable up to 50 ′ [15 m] with Model ST51, and up to 100 ′ [30 m] with Model ST51A

	ST51	ST51 A
Dual 4-20 mA outputs	■	■
4-20 mA per NAMUR NE43		■
HART I/O		■
500 Hz pulse output	■	■
Process operating temperature	To 250 °F [to 121 °C]	To 350 °F [to 177 °C]
Maximum remote distance	50 ′ [15 m]	100 ′ [30 m]
SIL compliance rating		■
Warranty *Standard*	1 year	2 years





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