Smith Meter®
miniBlend.net

Bulletin SSMB001 Issue/Rev. 0.1 (3/19)

Electronic Blending Controller

The Smith Meter® miniBlend.net is a micro-processor based blending control unit used for continuous in-line blending for applications such as biofuel blending that supports up to 12 recipes. The miniBlend.net provides blending by monitoring the flow rate and volumetric delivery of a wild stream product and controlling the delivery and flow rate of a blend stream product in order to provide a precise blend between the wild stream product and blend stream product.

Features

- Selectable upstream or downstream blend point configuration
- Selectable volume/mass totalization of the blend stream product
- Permissive signal input or communications to start and end transactions
- Transaction enabled output to indicate the blend stream product can deliver
- Programmable blend ratio percentages that are adjustable “on the fly”
- Automated Proving for blend stream meter
- Continuous monitoring of critical functions with Alarm outputs
- Ethernet communications interface using TCP/IP-protocol
- Modbus and Smith ASCII style communications
- 3 RS232/485 serial communication ports
- Configurable transaction report
- Programmable languages
- Digital valve control (blend stream product)
- Back pressure control (AFO method) with recovery
- Meter factor linearization 4 point
- Temperature and pressure compensation
- Explosion proof enclosure with optional display backed up per OIML
- API tables from Crude oil to LPG
- Promass mass meter communications
- EPA Ethanol and Biodiesel temperature
- Boolean/algebraic processing
- Factored blend stream product pulse output
- User configurable I/O
- Event logging/audit trail
- Transaction archiving
- Clean line flush control

Applications

Applications include Biofuel blending for blending products such as ethanol with gasoline or biodiesel with diesel. For installations requiring Dual Pulse Meter Inputs, the AccuLoad III and its wildstream blending function provides the solution for those applications as the miniBlend.net accepts Single Pulse Meter Inputs only. Please determine the requirements (potentially Weights and Measures) to choose the correct instrument for the application.

For load rack type blending requirements that do not have the ability to be handled by a blending preset such as an AccuLoad III to do blending at a load arm, the miniBlend.net provides for continuous wildstream in-line blending. These applications generally have a meter interfaced with a preset at the point of compartment loading. A pulse output from this meter, referred to as the wild stream meter as it is not flow controlled by the miniBlender, is interfaced to

the miniBlender. The flow rate for a blend stream product (ethanol or biodiesel) which is flow controlled by the miniBlender will be based on the flow rate of the wild stream meter and the blend point would be upstream of the wild stream meter. The miniBlend.net will adjust the flow rates for the controlled product to produce a programmed blend ratio between the wildstream product stream and the blend product stream.

The miniBlend.net can also be used for wildstream header blending. In this application a wildstream product meter would be used along with a controlled stream product meter and valve that is interfaced to the miniBlend.net that blends the products upstream of a multiple arm load rack or to a blended product tank. The blend point between the wild stream product and the blend stream product can be either upstream (sidestream) or downstream (ratio) of the wild stream meter.

During delivery of the blend stream product, at programmable time intervals the expected volume for the controlled product will be calculated based on the actual wild stream volume delivered. If the expected volume and the actual volume differ by more than a programmed blend correction volume, the miniBlender will adjust the flow rate to correct the blend ratio within the programmed amount of time.

Standard Features

Temperature Compensation

The temperature compensation feature provides the customer with the ability to compensate for variance in temperature from a reference temperature. This feature is used with an RTD input or a temperature transducer and, excluding the accuracy of the fluid temperature measurement, will exactly match the proper volume correction factor of ASTM-D-1250-04, and API MPMS CH 11.1 - 2004 tables as noted below, over the fluid temperature range of -58°F to 302°F (-50°C to 150°C). The following API tables can be programmed in the miniBlend.net: 5A, 5B, 5D, 6A, 6B, 6C, 6D, 23, 23A, 23B, 23D, 23E, 24, 24A, 24B, 24D, 24E, 53, 53A, 53B, 53D, 53E, 54, 54A, 54B, 54C, 54D, 54E, 59A, 59B, 59D, 59E, 60A, 60B, 60D, 60E, BR1A, BR1P, and BR2P.
ETH (EPA-RFS2), B100 (EPA-RFS2)

Pressure Compensation

Pressure compensation provides the customer with the ability to compensate the volume of product delivered at varying pressures per API Tables 11.2.1 and 11.2.2, using a 4-20 mA pressure transducer input. This feature also contains real-time control functions for maintaining system pressures at the meter to a minimally-acceptable, user-definable level (pressure transducer not included). Pressure compensation is particularly useful for light products, such as LPG, where the compressibility factor varies greatly with different pressures.

Density Correction

The density correction feature provides the customer with the ability to correct the volume of product delivered at varying densities. Using communications from a Promass Coriolis Meter, density can be read directly or obtained through a 4-20 mA input.

Automated Proving Mode

The miniBlend.net firmware provides an automated proving mode of operation for the Blend Stream Meter. When the automated proving mode is activated, the miniBlend.net will calculate the meter factor for a proving run based on information obtained during the prove. The operator can select the flow rate and meter factor being proved through the keypad of the miniBlend.net. After the prove is complete, the operator enters the prover volume and prover temperature and the miniBlend.net will calculate the new meter factor which the operator can download to the program or ignore. The miniBlend.net also has the capability of providing an average meter factor over a maximum of ten batches. This feature allows the operator to prove the meter at up to four different flow rates without having to enter the program mode for each meter factor.

Boolean and Algebraic Processing

The miniBlend.net provides the customer the flexibility to set-up inputs and outputs for tasks that are not standard in the unit. Through Boolean processing, relays can be turned on and off through equations and events set-up by the customer.

Algebraic processing is also an area the customer can use to do simple mathematical calculations not in the unit. These calculations can then be used on the configurable reports or delivery display for the current transaction being run by the unit. The last 5 user boolean and the last 5 user float registers are also stored with the transaction.

Shared Printing

Shared printing allows multiple miniBlend.nets to generate reports on a single printer. A single miniBlend.net can be configured to act as a "print server" (host) and all other miniBlend.nets to be "shared printers" (clients). Once the client miniBlend.nets are configured as shared printers, they will have their communication, transmit, and receive lines tied together and connected to a single comm port on the print server. When a shared printer miniBlend.net is done with a transaction and print is pressed on its keypad, the report is sent via communications to the host, where it will be printed.

Communications

The miniBlend.net is equipped with three standard programmable communication ports that can be set up to be either EIA-232 or EIA-485 compatible communication ports, with baud rates up to 38,400 bps. In addition to these three communication ports an Ethernet port is available which supports FTP, HTTP, and Modbus/TCP protocols.

Hardware Options

OIML Display

The miniBlend.net is designed to have two display options. The standard display option will operate until the power is lost and then will go blank. The OIML display option is the same display but when the power is lost, the display will maintain the data for reading by an operator for up to fifteen minutes.

Specifications

Accuracy

Calculated Accuracy: The gross at standard temperature to gross volume ratio, excluding the accuracy of fluid temperature measurement, will exactly match the proper volume correction factor or ASTM-D-1250-04 over fluid temperature range of -58°F to +302°F (-50°C to +150°C).

Temperature Measurement Accuracy: Fluid Temperature is measured to within +/- 0.72°F (+/-0.4°C) over the fluid temperature of -328°F to 572°F(-200°C to 300°C). Fluid temperature is measured to within +/-0.45°F (+/-0.25°C) over the fluid temperature range of 32°F to 572°F (0°C to 300°C)

Stability: 0.1°F(0.06°C)/year

Flow Totalization within one pulse of input frequency.

Electrical Inputs

AC Instrument Input Power

Dual Voltage input:115 or 230 VAC via Switch, 50/60 Hz.

Power consumption: Approximately 9 watts.

Power Interruption Tolerance: Interruption of power greater than 0.05 seconds (typical) will cause an orderly shut-down of the miniBlend.net and the control valve will be immediately signaled to close.

Digital (Meter Signal) Pulse Inputs

Type: Optically-isolated solid-state voltage sensors

Quantity: Two

Input Voltage Range: 5 to 28 Vdc compatible

Pickup Voltage: 5 Vdc minimum

Drop-Out Voltage: 1 Vdc maximum

Current at Maximum Voltage: 20 mA maximum

Minimum pulse input frquency: 3 Hz

Input Level Duration: 83 µS minimum

Digital Control Inputs

Type: Optically-isolated solid-state voltage sensors

Quantity: Three

Input Voltage Range: 5 to 28 Vdc compatible

Pickup Voltage: 5 Vdc minimum

Drop-Out Voltage: 1 Vdc maximum

Current at Maximum Voltage: 20 mA maximum

Input Level Duration: 120 mSec minimum

Analog Inputs

Type: 20-bit analog to digital converters

Function: One RTD, one 4-20 mA

Temperature (RTD – Resistance Temperature Device)

Type: Four-wire 100Ω platinum resistance temperature detector (PRTD)

PRTD Temperature Coefficient @ 32°F to be: 0.00214 Ω/Ω/°F (0.00385 Ω/Ω/°C)

Temperature Range: -148°F to +572°F (-100°C to +300°C)

Temperature Measurement Accuracy: ±0.72°F (±0.4°C) over the specified range

Current (4-20 mA) Input

Type: Two-wire, 4-20 mA current loop receiver, programmable as to function.

Span Adjustment: Program adjustable

Input Burden: 50Ω

Accuracy: ±0.025% of range

Resolution: One part in 1,048,576

Voltage Drop: Two volts maximum

Sampling Rate: One Sample/300 mSec minimum.

Electrical Outputs

DC Power

12 Vdc +/-5%, 180 mA maximum, short circuited protected.

AC Digital Outputs

Type: Optically isolated solid-state output user-programmable as to function

Quantity: Four

Load Voltage Range: 90 – 280 Vac (rms) 48 – 63 Hz

Steady-State Load Current Range: 0.05A (rms) minimum to 0.50 amp (rms) maximum into an inductive load.

Leakage Current at Maximum Voltage Rating: 2.5 mA maximum at 240 Vac.

On-State Voltage Drop: 2.0 Vac at maximum load

DC Digital Outputs

Type: Optically-isolated solid-state output user-programmable as to function

Quantity: Two

Switch Blocking Voltage: 30 Vdc maximum

Load Current: 150 mA maximum with 0.6 volt drop

Power down normally open

Pulse Output

Type: Optically-isolated solid state open-collector output. Pulser output units are program selectable through the miniBlend.net keypad or communications

Switch Blocking Voltage (Switch off):30 Vdc maximum

Load Current (Switch On): 10 mA with 0.6 volts drop

Frequency Range: 0 to 3000Hz

Duty Cycle: 50/50 (on/off)

Environmental

Ambient Operating Temperature:

-13°F to 140°F (-25°C to +60°C)

Humidity:

5 to 95% with condensation

Enclosure:

Explosion-proof (NEMA7, Class I, Groups C and D) and watertight (NEMA4X), IP 65

Hazardous Locations Approvals

North American:

UL/CUL Listed 557N UL File E23545

Class I, Groups C & D

Class I, Zone 1, Aex d [ib] IIB T6

UL Enclosure 4X, CSA Enclosure 4

Global

Ex d ib IIB T6 Gb (Um = 250V)

IP 65 Tamb = -25°C to +60°C

DEMKO 04 ATEX 0403315X

IEC Ex UL 04.0007X

Electromagnetic Compatibility

European Union:
EMC Directive 2014/30/EU
EM 61326-1 Electrical equipment for measurement, control and laboratory use.

Communications

Number of ports: Three plus Ethernet

Configuration: EIA-485 Four-wire or two wire Multi-drop network with optional termination resistor or EIA-232 Three-wire communications link

Data Rate: Programmable asynchronous data (Baud) rate from 2,400 to 38,400 bps

Data Format: Fixed at one start bit, one stop bit, eight data bits, and no parity

Line Protocol: Full duplex, no echo character.

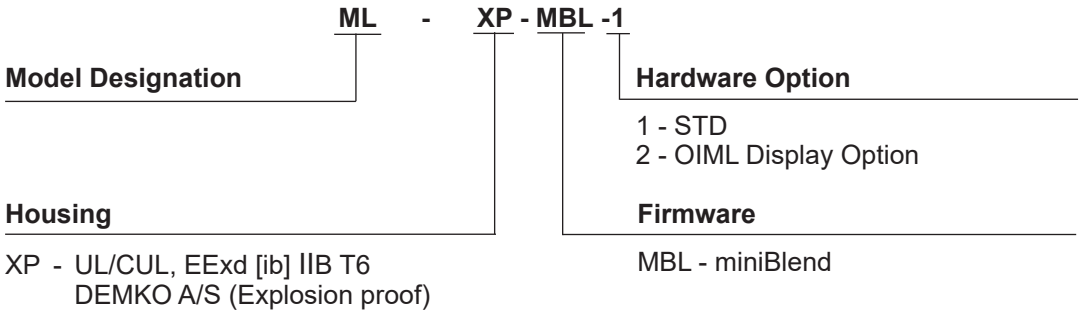
Data Structure: ASCII character oriented, modeled after ISO Standard 1155

Protocol: Smith Meter ASCII LRC, Smith Meter ASCII CR, Smith Meter ASCII binary, Modicon Modbus (PI-MBUS-300 Rev. D)

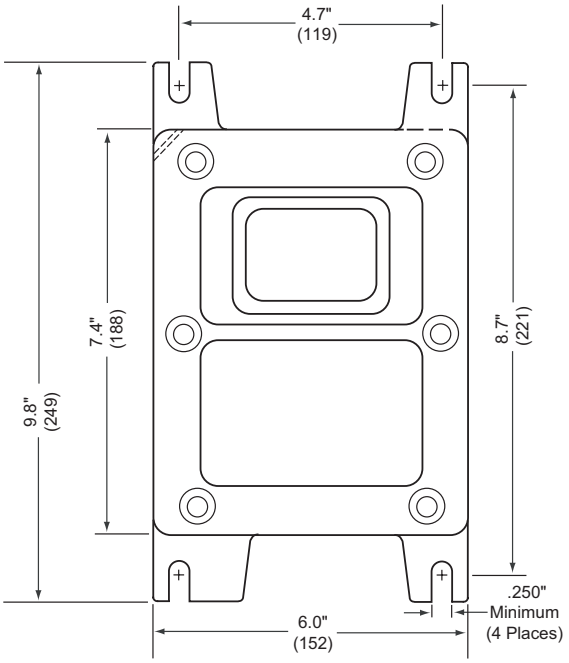
Ethernet: 10/100 Base TRJ-45

8 or 10 pin UTP (unshielded twisted pair) connector

miniBlend.net – Modeling

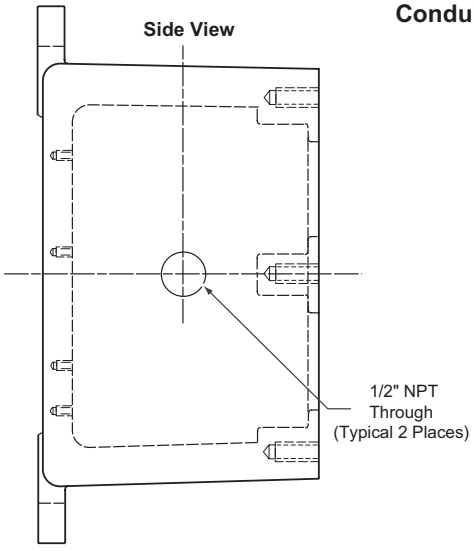


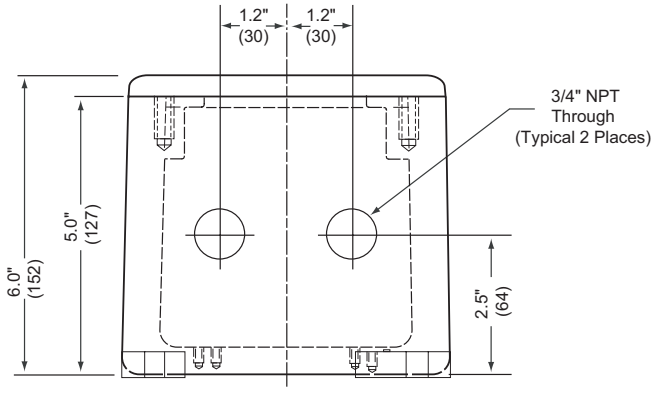
miniBlend.net – Dimensions



Note: Dimensions – Inches to the nearest tenth (millimetres to the nearest whole mm), each independently dimensioned from respective engineering drawings.

Conduit Entrances





Explosion-proof Housing

Revisions included in SSMB001 issue/rev. 0.1 (3/19):
Hazardous Location approvals and Electromagnetic Compatibility updated.

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