Electronic Blending Controller

FMC Technologies

Smith Meter® miniBlend.net™

Operations

Issue/Rev. 0.0 (3/11)

Bulletin MNMB003

miniBlend.net

Caution

The default or operating values used in this manual and in the program of the Smith Meter® miniBlend.net™ are for factory testing only and should not be construed as default or operating values for your metering system. Each metering system is unique and each program parameter must be reviewed and programmed for that specific metering system application.

Disclaimer

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Proprietary Notice

Table of Contents

How To Use This Manual

This manual is to be used as an operations guide for the miniBlend.net.

This manual is divided into sections: Introduction, Display and Controls, RUN Mode, Dynamic Displays, Control of Product Delivery, Automated Proving Mode, Miscellaneous, Program Mode and Index.

The “Display and Controls” section describes the miniBlend.net’s physical display screen and keypad as well as some of the basic messages that would occur.

The “RUN Mode” section describes the typical operation of a miniBlend.net.

The “Control of Product Delivery” section describes the blending function and clean line control.

The “Dynamic Displays” section describes the information that can be displayed by the miniBlend.net while in the “READY” state or in the RUN Mode.

The “Automated Proving Mode” section describes the procedures and events involved in meter proving with a miniBlend.net.

The “Miscellaneous” describes the transaction report available, Boolean processing, Pulse Output and Nonreset-table Totals.

The “Program Mode” section describes the mechanics of making configuration changes to a miniBlend.net using the integral display and keypad. See the Operator Reference Manual for details for details of the parameters that are affected in the Program Mode.

The “Index” is a comprehensive listing, with page numbers, of all subjects covered in this manual.

The examples presented in this manual are for clarity and operator convenience. The values might vary for specific installations and/or operations.

Product Description

The miniBlend.net is a microprocessor based blending control unit used for continuous in-line blending for biofuel applications that supports up to 12 recipes. This manual describes the functionality and operation of the miniBlend.net.

The miniBlend.net utilizes two product streams to perform blending. The wild stream is not flow controlled by the miniBlend.net, but is monitored by the pulse input received from the meter in that stream. The blend stream is flow controlled by the miniBlend.net based on the pulse input from the meter in that stream. Using the desired blending percentage programmed into the miniBlend.net, the Blend Stream is controlled to deliver the proper percentage of blend product into the Wild Stream using the wild stream's delivered product volume (based on the volumetric or mass input feedback from that stream). Both of these pulse inputs are single channel.

There are two meter plumbing configurations options available depending on the application. The Blend Stream can be plumbed upstream of the Wild Stream meter, which is referred to as "Side stream," or it can be plumbed downstream of the Wild Stream meter, which is referred to as "Ratio".

Features

- Selectable upstream or downstream blend point configuration
- Selectable volume/mass totalization of the blend stream product
- Permissive signal input 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"
- Alarm outputs
- Ethernet communications interface using TCP/IP protocol
- 3 RS232/485 serial communication ports
- Flash storage of firmware allowing for easier upgrades
- Programmable languages
- Digital valve control (blend stream product)
- Back pressure control (AFO method) with recovery
- Meter factor linearization 4 point
- Temperature and pressure compensation
- Promass mass meter communications
- Modbus and AccuLoad Smith Meter style communications
- Boolean/algebraic processing
- Factored blend stream product pulse output
- User configurable I/O
- Event logging
- Audit trail
- Transaction archiving
- Clean line control

The unit will operate in any one of three modes: "Ready", "Run", and "Program" modes. In the "Ready" mode, the miniBlend.net will be ready to enter the "Run" mode when the transaction permissive input and/or communications command is issued to start a transaction. "Dynamic Displays" are also available in the "Ready" and "Run" Modes. The "Program" Mode is used to configure the inputs and outputs and to set up the parameters required for blending control. "Program" Mode is not available in the "Run" mode.

Applications

Applications include Biofuel blending for blending products such as ethanol with gasoline or biodiesel with diesel.

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.

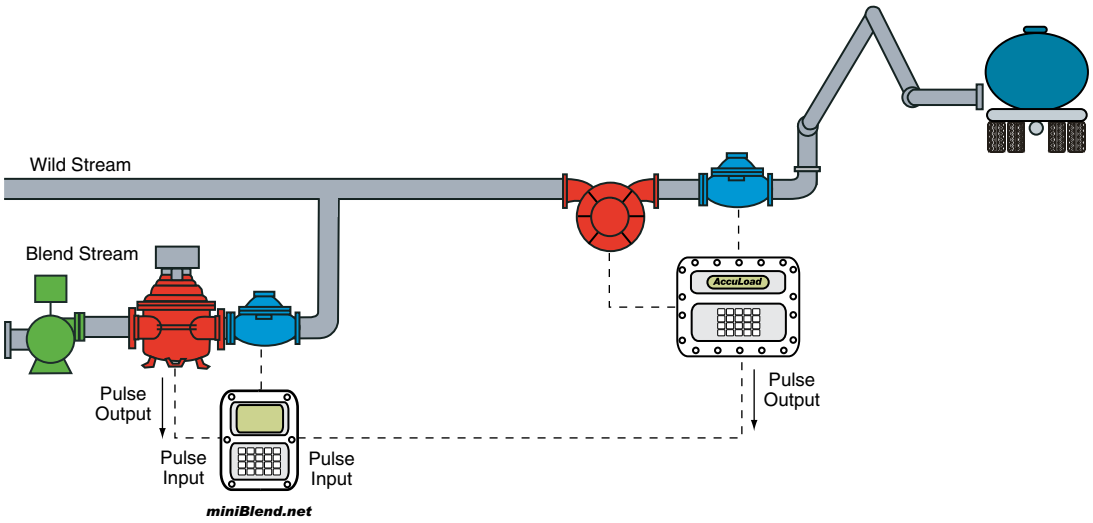
These applications generally have a meter interfaced with a preset at the point of compartment loading. A pulse output from this meter, referred to as the wild stream meter as it is not flow controlled by the miniBlend.net, is interfaced to the miniBlend.net. The flow rate for a blend stream product (ethanol or biodiesel) which is flow controlled by the miniBlend.net 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.

Load Rack Single Stream Blending

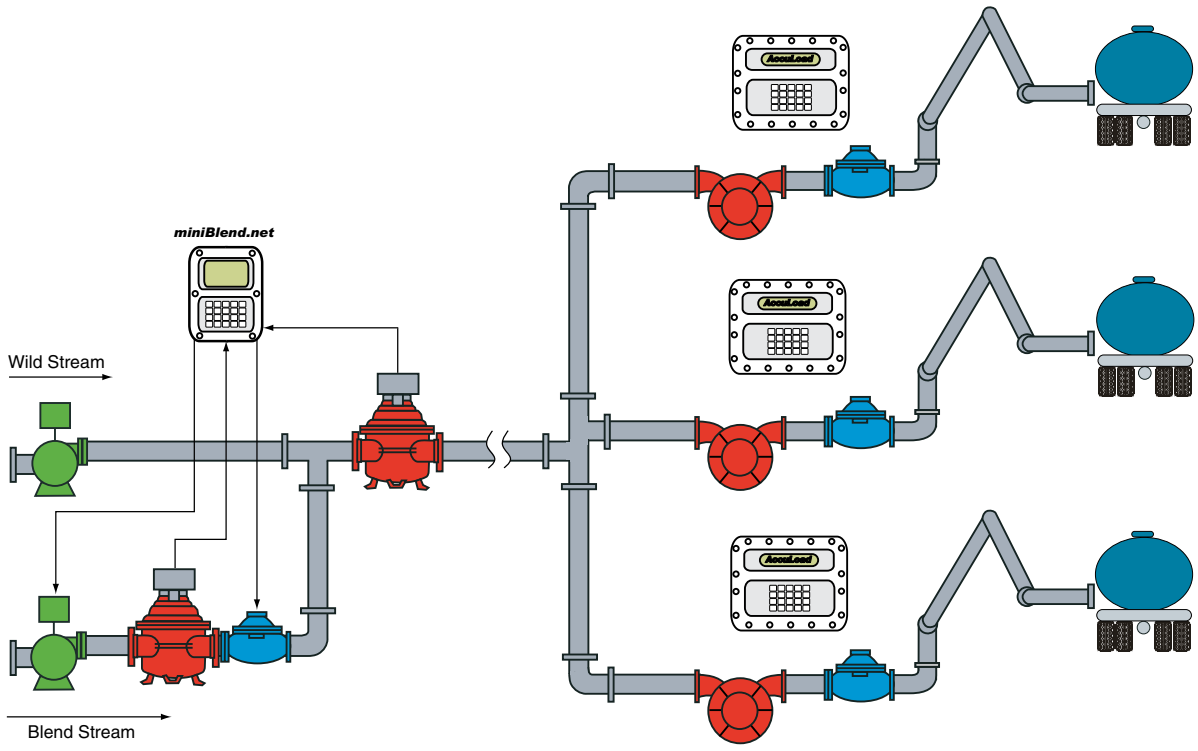
Upstream/Side Stream Configuration



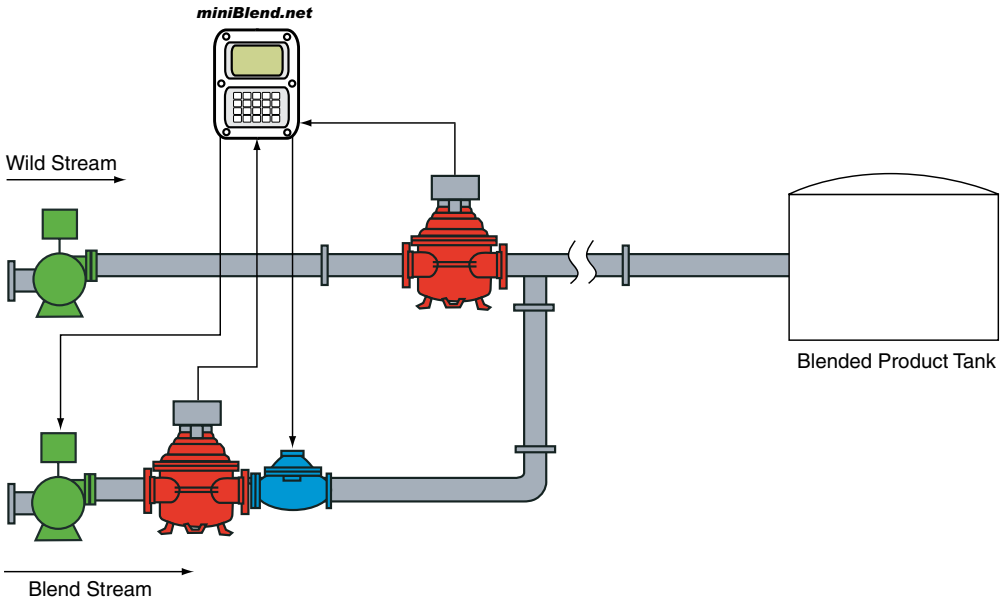
Note: *Pulse input to miniBlend.net can come directly from the meter.*

Wild Stream Blending

Applications



Upstream/Sidestream Configuration



Downstream/Ratio Configuration

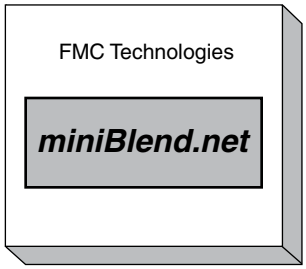
miniBlend.net Display and Controls

Figure 1. miniBlend.net Display and Controls

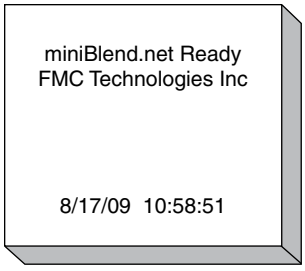
The user interfaces with the miniBlend.net through either one of its several communications ports or via the display and keypad found on the face of the instrument. The display and keypad alter their format and function based upon the mode (Run Mode, Programming Mode....) that the instrument is currently running. The following provides previews to the various screens as well as the keypad functions associated with the various modes.

Powerup

When the unit is powered up, a logo screen will be displayed during initialization.



The miniBlend.net will power up in the “Ready” Mode. The miniBlend.net will show the date and time of day, the programmed ready message and unit id. The default font used will allow 8 rows of characters with 21 characters per line.

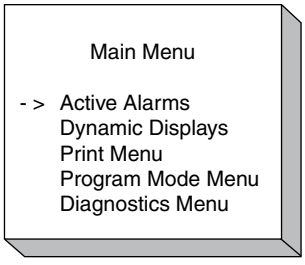


Ready Screen

If a transaction had been in progress when power was lost, the miniBlend.net will power up in the “Run” Mode. The pump and valve will be initially off until the transaction is restarted. The transaction will continue by delivering blend stream product as long as there is a wild stream flow rate greater than zero and the transaction permissive is still active. If the START key is enabled via “Program” Mode, it must be pressed in order for blend stream product to deliver.

If the unit was in the “Program” Mode when power was lost, the miniBlend.net will power up in the “Ready” Mode and any changes made in the program mode will not be saved.

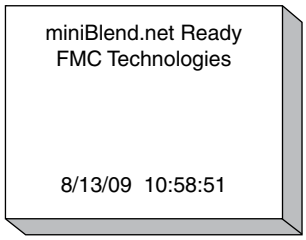
The operator may enter the “Program” Mode, view “Dynamic Displays” or “Diagnostics” by pressing the ENTER key to bring up the Main Menu.



Main Menu

RUN Mode

Prior to the transaction becoming active the miniBlend.net will show the date and time of day and the programmed ready messages.



Run Mode

Entry into "RUN" Mode is defined by program mode parameter "Transaction Start" that defines whether a Permissive Input and/or Communications command starts the transaction. When the transaction is first initiated a display test will be done next. All segments on the displays will turn on for 1 sec and then turn off for 1 sec. This will allow the operator a chance to verify the integrity of the display. The recipe to be delivered is determined by either the digital inputs programmed for recipe selects or by communications.

The START key is not used to start a blending transaction. It can be used to resume a transaction in progress provided program mode parameter "Start Key Disable" is set to "NO". The STOP key can be programmed to stop a transaction in progress (provided it is programmed to do so). If there is a digital output programmed for "Trans Enabled", it will be inactive if there are any conditions which prohibit a transaction from starting. This output can be used as a signal to another controller in the system that the miniBlend.net is in the "RUN" Mode and blending, or ready to blend.

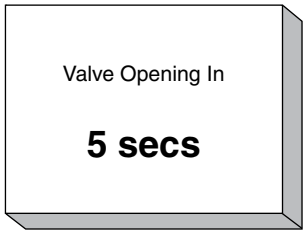
It should be noted that a preset amount is not entered via the keypad or through communications for a transaction. The preset amount will default to the value programmed in parameter "Auto Preset" if it is greater than zero. This parameter must be greater than zero when the Clean Line feature is required. If the parameter is zero, then the default preset amount is 9,999,999, and the unit is considered to be in the "Unlimited Preset" mode.

There is an option for a programmable valve delay that will allow time for the line to become packed before opening the valve. If used, then after the programmable valve delay time expires, the valve for the blend stream will be opened to start flow. The Blend stream pump will be turned on if the miniBlend.net is programmed to control the pump and a digital output is programmed for the pump. There are two options for the pump control:

If the "Pump Start" is programmed for "Transaction Enabled" the pump for the blend stream will turn on as soon as the transaction is enabled as defined by the "Transaction Start" parameter, regardless of the wild stream flow rate. The pump for the blend stream product will remain on until the transaction is ended.

If the "Pump Start" is set to "Wild Stream flow and Transaction Enabled" the miniBlend.net will turn on the pump when the transaction is enabled and the wild stream flow rate is greater than 50% of the minimum flow rate programmed for the blend stream product (205 Minimum Flow rate). The pump for the blend stream product will remain on until the wild stream flow rate drops to zero.

If parameter "231 Valve Delay to Open" is greater than zero, the valve for the blend stream product will not open until the time programmed in this parameter has expired. This will allow time for the line to become packed before opening the valve.

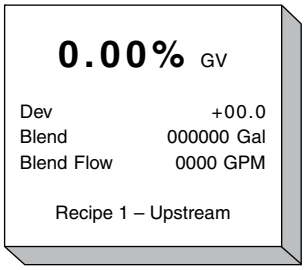


If parameter "233 Pump Delay to Off" is greater than zero, the blend stream pump will not turn off until the amount of time programmed in this parameter has expired, allowing line pressure to assist with closing the valve.

If the transaction is stopped using the Stop Key or remote stop switch, the pump will turn off. When the transaction is resumed, the pump for the blend stream product will turn on according to the programming of "234 Pump Start" as described above. No further changes can be made in "Program" Mode once "RUN" mode is entered.

A Blend recipe can be changed at any time during the “Ready” Mode or “RUN” Mode. This recipe will become the active recipe for the current or next transaction. The recipe can be changed by the recipe select digital inputs or via serial communications.

The following display will appear on the miniBlend.net at the start of “RUN” Mode:

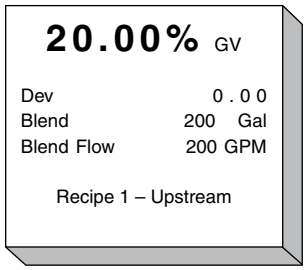


The default display above will show the current blend ratio of the blend stream product as well as the programmed blend delivery type. It will also display the deviation count. This is the difference in expected volume and actual volume of blend product. A positive deviation indicates that there is more blend stream product volume passing through the blender than the blend percentage is calling for. A negative deviation means there is less blend stream product than the blend percentage is calling for.

The display will also indicate the total amount delivered for the blend stream according to the compensation amount selected. The blend ratio, deviation count and blend stream total indicated are relative to when a transaction was started. The flow rate of the blend stream is also indicated. The flow rate is indicated volume (IV) flow rate of the blend stream product.

The last line on the display indicates the name of the current blend recipe delivered as well as the selected location point of the blend stream to the wild stream as selected in program mode.

If an alarm condition becomes present during run mode, the following is an example of how the display will be indicated. Pressing the ENTER key on the keypad will advance the display to the Main Menu where the operator can enter “Active Alarms”. This will allow the operator to clear the desirable alarm condition using the ENTER key along with the correct passcode if required. Alarm conditions can also be cleared via host communications or by the “Alarm Reset” digital input (if it is configured).



Safety and volume accuracy functions such as (but not limited to) excess high flow, low flow, and temperature probe failure would also be monitored as programmed. If at any time an alarm condition is detected, the miniBlend.net will indicate the alarm condition on the display. An alarm condition will not shut down the delivery of the blend stream product as long as it is not programmed to do so and as long as the flow rate of the wild stream product is considered above zero. If the STOP key is enabled via “Program” Mode, it can be used to shut down the delivery of the blend stream product even if wild stream product is flowing. Pressing the START key will enable delivery of blend stream product, as long as the wild stream flow rate is above zero and the transaction has not been terminated. If the miniBlend.net is commanded to shut down the blend stream product while a transaction is in progress, the “Transaction Enabled” digital output will become inactive.

A transaction is considered complete when the transaction permissive goes inactive, and/or a software communication command is issued to end the transaction. At this point, the previous transaction data will be stored in flash memory. Data stored in flash memory can be recalled in order to review past transaction totals and averages.

Configurable Delivery Display

The miniBlend.net will allow for the delivery display to be configurable using BlendMate. Using BlendMate, a configurable display may be defined and downloaded to the miniBlend.net. Any item in the database may be located anywhere on the display. The font may also be chosen for each item. The miniBlend.net can be programmed to display either the configurable delivery display or the default display.

If no configurable display has been downloaded, this selection will not be entered and the default display will be used.

User defined text strings may also be defined for the configurable display. These text strings will be downloaded with the display.

Keypad Functions Blend Mode

The pushbuttons on the keypad perform the following functions in the Blend Mode:

Key	**Function**
0-9	Not Used
CLEAR	Used to go back to the main delivery display while viewing the “Dynamic Displays”
ENTER	Used to enter the various “Dynamic Displays”
PRINT	Not Used
SET	Not Used
START	Used to resume blend product delivery after STOP key is pressed
STOP	Used to stop blend product delivery at any time provided the key is enabled (not intended as emergency stop)
Up Arrow	Used to navigate through the various data provided in the “Dynamic Displays”
Down Arrow	Used to navigate through the various data provided in the “Dynamic Displays”
Side Arrow	Used to navigate through the various data provided in the “Dynamic Displays”
F1	Not used
F2	Not used

Overview

The miniBlend.net provides continuous in-line blending by monitoring the flow rate and delivery of the wild stream and controlling the delivery and flow rate of the blend stream, in order to provide a precise blend between the wild stream product and blend stream product. There is no preset volume entered on the miniBlend.net when a transaction is started. However, if Clean Line functionality is required, the value programmed in "Auto Preset" will become the preset amount. The values programmed for "Clean Line Volume", and "Clean Start Control" will determine when the miniBlend.net will stop delivery of the blend product for the transaction.

The blend point between the wild stream product and the blend stream product can be upstream or downstream of the wild stream meter.

The pulse input from the wild stream meter to the miniBlend.net can be programmed to be compensated or uncompensated for temperature, density or pressure. If the pulse input is compensated, it is assumed to be compensated the same as the blend stream (as programmed in parameter "Blend Amount Type"). If the pulse input is uncompensated, the miniBlend.net will have the capability of compensating the wild stream to the desired blending volume or mass. There are two analog inputs offered by the miniBlend.net. The RTD analog input can be the temperature source for either the wild stream or blend stream, while the 4-20mA analog input can be the temperature probe source for the other.

If separate probes are not configured, then the miniBlend.net can be configured to share a temperature probe for the wild stream and blend stream. The analog inputs can also be used for pressure and density; pressure and density inputs can also be shared between both streams.

Blending Flow Control and Correction

The desired flow rate for the blend stream product will be based on the flow rate of the wild stream. The miniBlend.net will adjust the flow rates for the controlled product to produce the programmed blend ratio.

The parameters next described can be located in the Blend Control and Blend Stream Directories. The miniBlend.net has a programmable maximum flow rate that will not be exceeded during blend stream product delivery in a transaction. The miniBlend.net has a programmable minimum flow rate that will not be not less than minimum flow during blending. However, it is programmable as to whether the flow valve should maintain the minimum flow rate or close (turn off and on) in order to maintain the blend. There is a programmable high flow alarm and a programmable low flow alarm. When the flow rate is outside these limits an alarm will occur, indicating the condition. The alarm will not shut down the delivery of the blend stream product unless programmed to do so. The alarm relay output will become active, if programmed accordingly, when a high flow alarm or low flow alarm is present. If a transaction enabled digital output is programmed, it could be tied to a permissive input on the controller for the wild stream meter. If a particular alarm condition is programmed to shut down blend stream flow, the transaction enabled digital output from the miniBlend.net will become inactive. When the wild stream controller senses that this output is inactive, it can shut down the flow of the wild stream product. Once the condition is corrected that caused the miniBlend.net to alarm, the alarm condition can be cleared on the miniBlend.net, the transaction enabled output will once again become active, and flow can be resumed by the wild stream controller. This, in turn will cause miniBlend.net to resume flow of the blend stream product. The transaction is resumed by pressing the START key, host communications or remote start.

During delivery of the blend stream product, at programmable time intervals (using parameter – "Blend Factor Time"), 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, a new desired flow rate for the controlled product will be calculated to correct the blend ratio. The miniBlend.net will correct the blend ratio within a programmable amount of time as set in program parameter "Blend Correction Time".

The blend tolerance parameters in the Blend Control Directory are used as follows:

"**Blend Correct Amount"** – when exceeded miniBlend.net will start making blend corrections.

"**Blend Tolerance Amount"** – if exceeded for programmed amount of time (Blend Tolerance Timeout), set alarm.

When a blend correction is made, and a new desired flow rate has been calculated, the tighter flow adjust tolerance will be used for the time programmed into the flow adjust timer. These parameters are in the Blend Stream/Meter Control Directory.

Parameter "Maintain Min Flow" will allow the option as to whether or not the blend stream product valve may be

closed during the transaction in order to maintain the desired blend. If it's desirable to close the valve, then when a calculated flow rate below "Min Flow Rate" is determined, the valve will close for a time period determined by parameter "Min Close Time."

The volume type (ex. GV, GST, mass) used for blend control will be programmable via parameter "Blend Delivery Type." Note that the GV, GST and GSV volumes will be calculated using batch load average meter factor, temperature and density. Therefore, if blending into multiple compartments and trucks throughout the day using these volume types, transactions should be reset more frequently for more accurate blending results.

Blend Delivery

The SET and START key will never be used to start a blending transaction. The START key can be used to resume delivery of the blend stream product during a transaction (if it is programmed to do so). The STOP key can be used to stop delivery of blend stream product, but it will not end a transaction. The PRINT key on the miniBlend.net cannot end a blending transaction. If the blend stream product delivery is halted due to the STOP key, or if an alarm condition is programmed to stop the blend stream, the transaction enabled digital output will become inactive.

Recipes for the transaction can never be selected by the keypad, regardless of how the transaction is started. Recipes 1 through 8 can be selected by Recipe Select Digital Inputs or through communication command (NR) New Recipe. Recipes 9 through 12 can only be selected using the communications command.

The recipe may be changed while a transaction is in progress, using the recipe select digital inputs, or by using the new NR (new recipe) host communications command. The transaction will not be ended and the new recipe blend % will be used from that point on.

- Recipe Select Digital Inputs

There are optional digital input functions that allow for the remote selection of recipes and starting of transactions. Up to 3 digital inputs may be used to select from recipe 1 thru 8 (i.e. the digital inputs are binary encoded).

Input #3	Input #2	Input #1	
Off	Off	Off	Recipe #1
Off	Off	On	Recipe #2
Off	On	Off	Recipe #3
Off	On	On	Recipe #4
On	Off	Off	Recipe #5
On	Off	On	Recipe #6
On	On	Off	Recipe #7
On	On	On	Recipe #8

The transaction is started as defined by program mode parameter "Transaction Start" in the General Purpose Directory. It allows the transaction to be started with the transaction permissive going from inactive to active or with a communication command. The "Transaction Start" command may require both an active transaction permissive and a communications command. If the method programmed to start a transaction is Communications and Permissive, the recipe that will be used for the transaction will be as follows:

The "SB" communication command is used to initiate a new transaction. If the "SB" command includes a recipe number as part of the command, that recipe will be used at the start. The recipe sent by communications will override the recipe number indicated by the digital inputs for recipe select. The delivery for the transaction will begin once the digital input for the "Transaction Start" becomes active. If during the course of the transaction delivery the digital inputs for recipe select change then the active recipe will be according to these digital inputs. A recipe can also change during a transaction if the "NR" command is issued. The "NR" command is used to change a recipe within a transaction. It does not start a new transaction. If the "SB" command does not have a recipe as an argument then the recipe indicated by the recipe select digital inputs will become the active recipe for the transaction. If there are no digital inputs for selecting recipes and the "SB" communication command does not have a recipe sent with it, the recipe

used at the start of the transaction will be the first active recipe found in “Program” Mode. In other words, if recipe 1 and 2 are active, recipe 1 will be used by default since it is the first active recipe found by the recipe select algorithm.

What is important to note here is that a recipe number sent with the “SB” communication command will override the recipe indicated by the digital inputs at the start of the transaction.

If the method programmed to start a transaction is “digital input permissive or communications”, the recipe that will be used for the transaction will be as follows:

If the transaction is initiated with the “SB” command, the recipe that will be used will be the recipe sent with the “SB” command. If no recipe is sent with the SB command, then the value indicated by the recipe select digital inputs will be used at transaction start. If the transaction is initiated with the transaction digital input, then the recipe used at transaction start will be that indicated by the recipe digital inputs. If there are no digital inputs for selecting recipes, and the “SB” communication command does not have a recipe sent with it, the recipe used at the start of the transaction will be the first active recipe found in “Program” Mode. In other words, if recipe 1 and 2 are active, recipe 1 will be used by default since it is the first active recipe found by the recipe select algorithm. During the course of the transaction the recipe can be changed by the “NR” communication command or a change in the recipe digital inputs.

The important point here is that the recipe used at transaction start can be indicated by either the communication command or digital inputs, depending on how the transaction was initiated.

Even though the miniBlend.net is intended for continuous in-line blending, it is suggested that the transactions be ended at least every 24 hours, so that data can be archived and transaction totals and load averages can be reset. The maximum programmable preset transaction size is limited to 9,999,999 units of volume or mass. If the programmable “Auto Preset” is zero, the maximum transaction size is still limited to 9,999,999.

Programmable parameters “Transaction Reset Time” and “Start Hour” allow specifying a time interval in hours to automatically end the current transaction and restart a new transaction, regardless of whether there is flow, as long as there is a transaction in progress. This will provide a method to automatically start a new transaction at every 24 hours for example.

For blend stream product, load average meter factor, temperature, density and pressure for the transaction will still be calculated and used to calculate GV, GST and GSV volumes and mass. Therefore, if the transaction is reset once every 24 hours, the load averages will be averaged over 24 hours.

The blend ratio will be continuously monitored. An alarm (BH: Blend High or BL: Blend Low) will be set if the blend ratio falls outside of the blend tolerance range programmed into the “Blend Tolerance Amount” parameter for longer than a programmable amount of time. The “Blend Tolerance Percentage” parameter will not be available if “Auto Preset” is zero (unlimited preset). Since batch volumes can be very large, a blend % would allow more error as the delivered volume increases.

The zero flow timer may be used to monitor for no flow conditions during a transaction on the blend stream product and the wild stream product. The valve fault timer may be used to indicate flow on any of the product streams, if no transaction is in progress.

If there is no transaction in progress (transaction permissive disabled) and/or a communication command ended a transaction prior to miniBlend.net power-down, the miniBlend.net will power-up in the “Ready” Mode. A power-fail alarm will also be indicated on the miniBlend.net display. This alarm can be cleared by the ENTER key or communication command.

If a transaction is in progress when the miniBlend.net powers-up, the miniBlend.net will automatically resume delivery of blend stream product, provided that wild stream product is delivering with a flow rate greater than zero and the START key is disabled. If the START key is enabled, the transaction will not resume until the START key is pressed. It is advisable for the wild stream controller to sense when the miniBlend.net is powered down. When the miniBlend.net is powered down, the wild stream controller can shut down the wild stream flow, so that the blended component in the final delivery compartment is on spec.

If parameter “Stop Key Disable” is set to “No”, the user may press the STOP key at any time to stop the flow on the blend stream product, regardless of whether there is flow on the wild stream. The Transaction must be re-started with the START key before the transaction will resume. By default, the START and STOP keys will be enabled in “Program” Mode. Totalization of the wild stream product will continue if the STOP key is pressed.

The transaction can be terminated as programmed in parameter “Transaction Termination”. The transaction can be terminated via the transaction permissive digital input going inactive, and/or a communications command to end the transaction. The PRINT key will not be used to end the transaction.

Example Program Configuration

Below is an example of a possible miniBlend configuration. In this example, parameter (General Purpose Dir 145) is programmed to zero, indicating the miniBlend is in an unlimited delivery mode.

The miniBlend monitors the blend in process once a second. If the delivered amount of the blend product is off by more than 3 gallons (Blend Control Dir 203), the flow for the product will be adjusted to correct the blend within the next 10 seconds (Blend Control Dir 204).

The blend will also be monitored for alarm conditions. If the delivered amount of the blend product is off by more than 5 gallons (Blend Control Dir 202) for 15 seconds (Blend Control Dir 221), a blend low or a blend high alarm will be set. Blend alarms will be ignored for the first 200 gallons (Blend Control Dir 222) at the start of a transaction, after any re-start of a transaction or after any “on the fly” recipe changes.

When controlling the flow rate, the miniBlend will allow the flow rate to vary by 7.0% (Blend Stream Meter Dir 201) without making a valve adjustment. If a blend correction is made, a tighter flow tolerance of 4% (Blend Stream Meter Dir 203) will be used for 5 seconds (Blend Stream Meter Dir 204).

General Purpose Dir

145 Auto Preset = 0

Blend Control Dir

202 Blend Tolerance Amount = 5.0 gal

203 Blend Correction Amount = 3.0 gal

204 Blend Correction Time = 10 sec

221 Blend Alarm Timer = 15 sec

222 Blend Alarm Min Amt = 200 gal

Blend Stream Meter

201 Flow Tolerance = 7%

203 Flow Adj Tol = 4%

204 Flow Adjust Time = 5 sec

205 Min Flow Rate = set according to meter

209 High Flow Rate = set according to meter

Clean Line Control

This feature allows a programmable amount of product to be blend free when flow stops at the end of a transaction. The amount that will remain blend free is defined in parameter “Clean Line Amount”. Before the remaining preset amount reaches the value in “Clean Line Amount” a greater percentage of the blend stream product will deliver, in order to deliver all blend stream product required for the transaction. The miniBlend.net will monitor the transaction remaining amount. When the remaining amount is equal to the “Clean Line Amount,” the miniBlend.net will shut down the blend stream valve while the transaction permissive input is active. The miniBlend.net expects the value programmed in “Clean Line Amount” to deliver, bringing the blend percentage within specification. At the end of the transaction, the miniBlend.net will insure that enough blend free product delivered, according to parameter “Clean Alarm Limit”. If the “Clean Line Amount” under runs greater than the value in “Clean Alarm Limit,” a “Clean Line Alarm” will occur.

If “Clean Line Amount” is zero, there will be no blend free product at the end of the transaction.

Example Program Configuration with Clean Line Flush

Below is an example of a possible miniBlend configuration using the clean line feature. In this example, parameter (General Purpose Dir 145) is programmed to a non-zero number that indicates the amount of blended product to deliver for the transaction. In the example below, 2500 units will deliver. Clean Line operation requires an auto preset amount.

The miniBlend monitors the blend in process once a second. If the delivered amount of the blend product is off by more than 3 gallons (Blend Control Dir 203), the flow for the product will be adjusted to correct the blend within the next 10 seconds (Blend Control Dir 204).

The blend will also be monitored for alarm conditions. If the delivered amount of the blend product is off by more than 5 gallons (Blend Control Dir 202) for 15 seconds (Blend Control Dir 221), a blend low or a blend high alarm will be set. Blend alarms will be ignored for the first 200 gallons (Blend Control Dir 222) at the start of a transaction, after any re-start of a transaction or after any “on the fly” recipe changes.

When controlling the flow rate, the miniBlend will allow the flow rate to vary by 7.0% (Blend Stream Meter Dir 201) without making a valve adjustment. If a blend correction is made, a tighter flow tolerance of 4% (Blend Stream Meter Dir 203) will be used for 5 seconds (Blend Stream Meter Dir 204).

When there are 50 gallons remaining to be delivered the blend stream product should end its delivery allowing the wild stream product to completely flush the delivery line of any blend stream product. The line will pack with wild stream product. If less than 45 gallons of wild stream product deliver after the blend stream product shuts down, a “Clean Line Alarm” will occur, indicating the line may not be completely flushed of the blend stream product.

General Purpose Dir

145 Auto Preset = 2500

Blend Control Dir

202 Blend Tolerance Amount = 5.0 gal

203 Blend Correction Amount = 3.0 gal

204 Blend Correction Time = 10 sec

207 Clean Line Amount = 50 gal

221 Blend Alarm Timer = 15 sec

222 Blend Alarm Min Amt = 200 gal

223 Clean Alarm Limit = 5 gal

Blend Stream Meter

201 Flow Tolerance = 7%

203 Flow Adj Tol = 4%

204 Flow Adjust Time = 5 sec

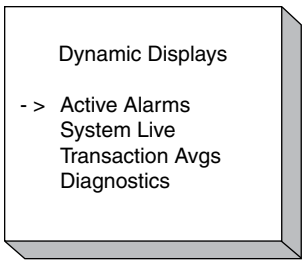
205 Min Flow Rate = set according to meter

209 High Flow Rate = set according to meter

Dynamic Displays

The items listed below can be dynamically displayed during either the “Ready” or “RUN” modes. The “Dynamic Displays” will be displayed for a programmable amount of time in seconds (See dynamic display time-out program code).

The “Dynamic Displays” may be accessed by first pressing the ENTER key to display the Main Menu and then selecting “Dynamic Displays”.



Dynamic Displays Screen

If a transaction is in progress, the “Dynamic Displays” may be accessed by pressing the ENTER key from the delivery screen.

Keypad Functions

0 - 9 Used to enter the desired batch number on batch dynamic displays, etc.

↑ Used to navigate backwards through the menu to get into the displays. When in the “Dynamic Displays,” the up arrow also moves backward through the displays.

← Once in the “Dynamic Displays,” this works like the up arrow to move backwards through the displays.

→ Once in the “Dynamic Displays,” this works like the down arrow to move forward through the displays.

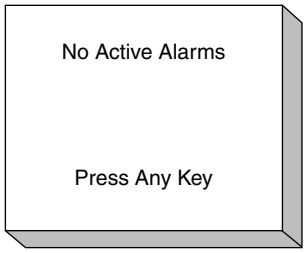
↓ Used to navigate forward through the menu to get in to the display. When in the “Dynamic Displays,” the down arrow also moves forward through the displays.

CLEAR Used to exit the “Dynamic Display.”

ENTER Used to enter the “Dynamic Display” menu and to enter the dynamic displays from the menu.

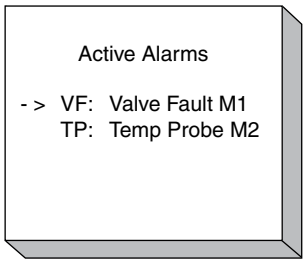
Active Alarms

Once in the Active Alarms dynamic display, the operator can view and clear any alarms conditions that are present. If no alarms are present, the following display will be indicated:



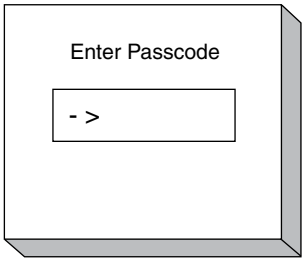
No Active Alarms Screen

If alarms are present, they will be displayed as indicated in the following example:



Active Alarms Screen

With the arrow indicating the alarm to be cleared, the operator can press the ENTER key. If a passcode is required to clear the alarm, the following display will appear:



Enter Passcode Screen

Once the correct four digit passcode is entered, the ENTER key is pressed and the alarm will be cleared.

The following alarms will be generated in response to system-level failures of various components of the miniBlend.net hardware:

Code	Condition
DA	Flash Error – Indicates that there was a failure in the flash memory when data was being stored.
DA	Watchdog Reset – Indicates that an internal check feature has detected a possible operational problem in the microprocessor that may have affected information stored in memory.
DA	RAM Bad – Indicates RAM test failed.
DA	ROM Bad – Test Failed – Indicates ROM test failed.
DA	Program Error – Invalid program mode entry.
DA	Passcodes Reset
DA	RAM Corrupt
DA	Flash Backup Bad
PA	Powerfail Alarm

Diagnostic Alarms

In addition to various system level alarms reporting the status of the electronics and integrity of data storage, the following run-time related alarm conditions can be reported by the miniBlend.net:

Code	Condition
BH	Blend High Alarm
BL	Blend Low Alarm
BP	Back Pressure – Unable to maintain desired flow rate.
CL	Clean Line Alarm
CM	Communications Alarm – Communications failures on one of the communications channels.
DR	Density Transducer
HD	High Density
HF	High Flow – Flow rate has exceeded limit set by Excess High Flow program code for more than the programmed time alarm limit (seconds).
HP	High Pressure Alarm
HT	High Temperature – Temperature probe or transducer has exceeded the programmed high limit.
LA	Blend stream, wild stream leakage alarm, actual leakage greater than leakage alarm limit.
LD	Low Density
LF	Low Flow – Flow rate was at or below the minimum flow rate established by low flow limit program code for longer than the programmed time alarm limit (seconds).
LP	Low Pressure Alarm
LT	Low Temperature – Temperature probe or transducer has fallen below the programmed low limit.
MF	Mass Meter Comm Failure
OA	Overrun Alarm – Volume delivered has exceeded the preset amount by at least the number of units set in the Overrun Limit program code (system and product).
PM	Promass Alarm (mass meter)
PP	PTB Printer Failure
PR	Pressure Transducer
SP	Shared Printer
TP	Temperature Probe – Short or open condition in the temperature probe circuit.
VF	Valve Fault – The valve did not close within the programmed time alarm limit (seconds)after receiving the signal to close.
U1-U5	User Alarm #1 – User Alarm #5 – The user may associate an input with an alarm condition. When the input is energized, the alarm will be reported by miniBlend.net.
ZF	Zero Flow

Run-Time Alarm Conditions

The user will be able to configure which alarm actions will apply to the various alarms on a per-alarm basis. The following actions are possible:

Energize the alarm output #1, if configured
Energize the alarm output #2, if configured
Allow alarm to be cleared in run mode without a passcode
Disable blend stream flow

Configurable Alarm Actions

If one of the user alarms is active, an alarm using the programmable user alarm message will be displayed, to facilitate a variety of site-specific alarms.

The user will be able to view currently active alarms, in addition to an alarm history. The eighteen most recent alarms will be available for viewing locally, with the most recent alarm shown first. Date and time will record when the alarm occurred.

Clearing Alarms

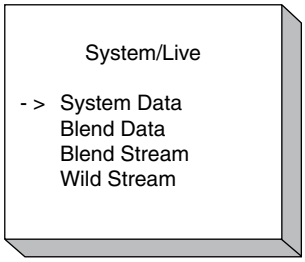
Alarms that occur may be cleared through the keypad, alarm reset input (if it's configured), and through the communications interface.

User Defined Alarms

There will be 5 user definable alarms added to the database. Each of these may be set using the Boolean equations. The user will be able to define a text string for each of the 5 alarms to be used on displays and reports. Since these alarms are in the database, they may also be set or viewed via communications.

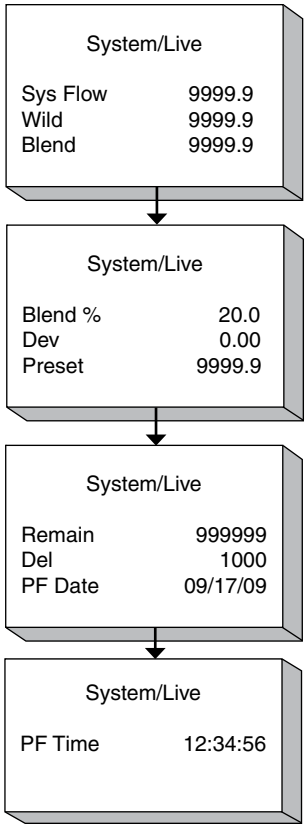
System/Live

When this display is entered the operator can select whether to view the data for the System, Blend Stream or Wild Stream as indicated below.

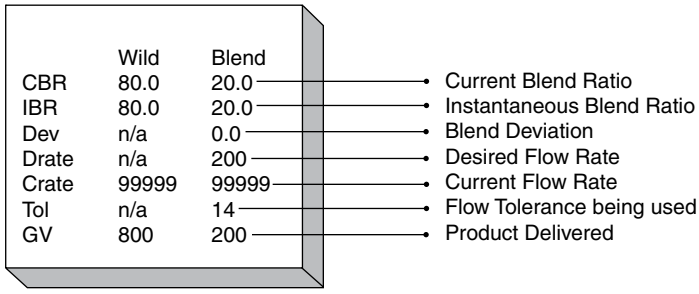


System/Live Screen

Once in the "System Live – System Data" dynamic display, press the arrow keys to advance to the next page of variables. Press CLEAR key to exit the "System Data" dynamic displays. Each time a key is pressed, the "Dynamic Display" Timeout Timer is reset. The System displays indicate the current flow rates and volumes for the wild stream and blend stream. They also indicate the current values used for calculating the compensated volumes for the blend stream product.



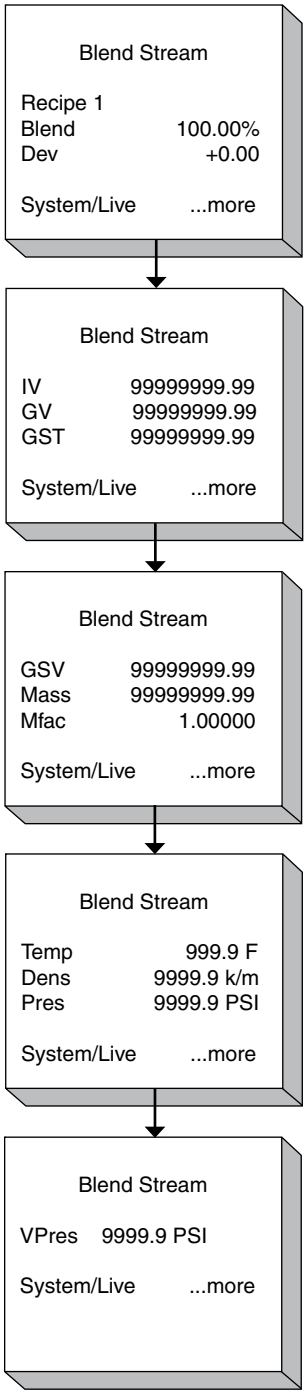
The preset amount in the above display is according to the value programmed in parameter “Auto Preset”. This parameter must be greater than zero when the Clean Line feature is used. If “Auto Preset” is programmed at zero, then the default preset size is 9,999,999 and the unit is considered to be in the unlimited preset mode. The preset and delivered transaction amount above includes the blend stream product along with the wild stream product. It’s the volume/mass of the two products blended together. An asterisk (*) indicated next to the Current Flow rate indicates that Automatic Flow Optimization is in process.



The above display indicates data for the blend stream and wild stream while the blend is in progress. It provides information about the blend currently in progress.

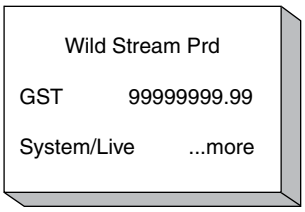
Note: *An asterisk (*) next to CBR indicates a blend correction is in progress.*

The following displays are indicated when “Blend Stream” is selected from “System/Live”:



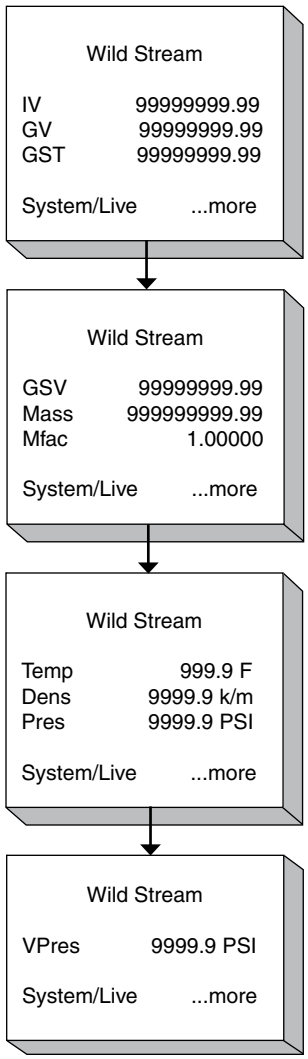
The temperature, density, pressure and vapor pressure above are the current (not average) values of the blend stream product.

The following displays will be indicated when the “System/Live – Wild Stream” dynamic display is selected:



The wild stream amount indicated in the above display is the volume/mass of the wild stream product (blend stream product not included). The amount indicated is relative to the blend delivery type. If the blend stream meter is plumbed upstream of the wild stream meter, then the wild stream amount will be the amount measured by the wild stream meter minus the equivalent volume type measured by the blend stream meter. Only one volume type will appear when the wild stream pulse input is applied already compensated. This volume type is the same as programmed in program mode parameter “Blend Amount Type”. No other volume types or mass are calculated for the wild stream product.

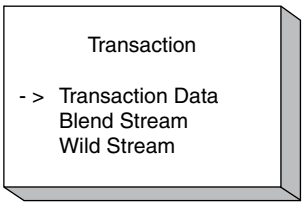
If the miniBlend.net is required to compensate the wild stream volume, then the following displays will be indicated as long as that volume type or mass can be calculated by the miniBlend.net:



The temperature, density, pressure and vapor pressure above are the current (not average) values of the wild stream product.

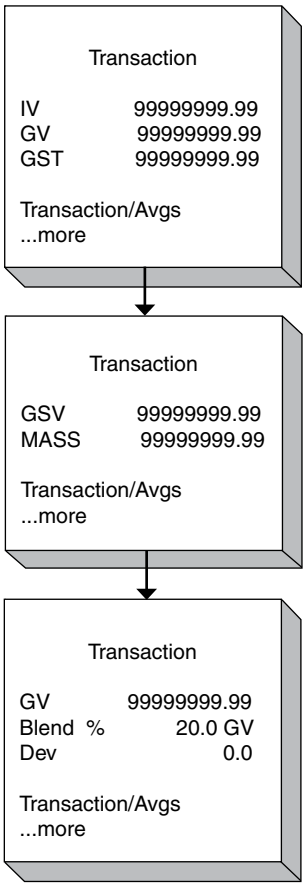
Transaction/Avg

When this display is entered, the operator can select whether to view the transaction data for the Transaction, Blend Stream or Wild Stream as indicated below. The “Transaction” dynamic displays indicate the current totals and average values used to determine the compensated volumes.

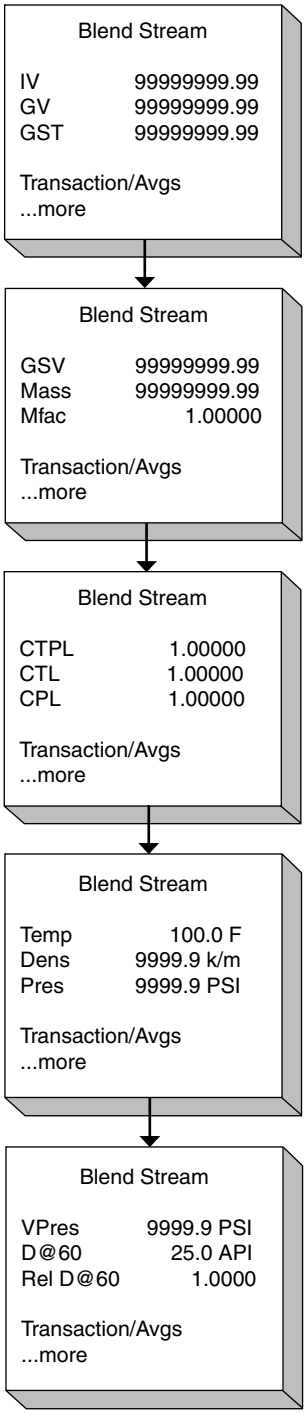


Transaction Screen

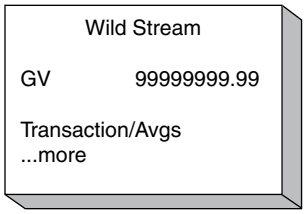
When the “Transaction – Transaction Data” display is selected, the following data will appear:



When the “Transaction – Blend Stream” display is selected the following data will appear. Any temperature, pressure, density, and correction factor data are load average based:

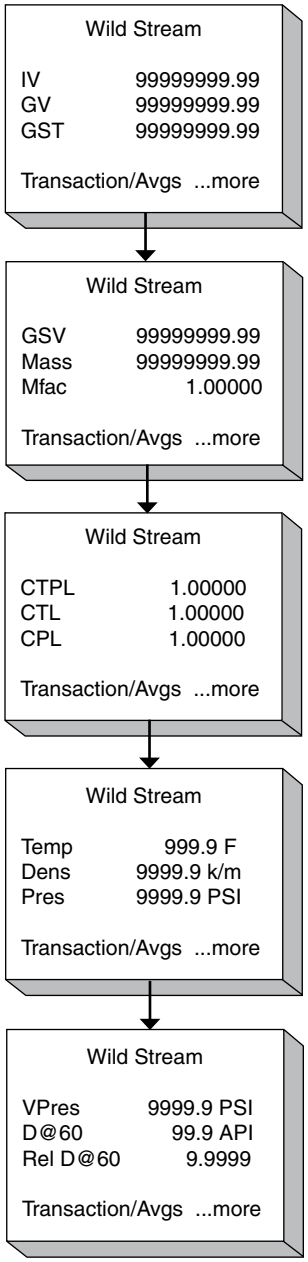


When the “Transaction – Wild Stream” display is selected, the following data will appear. Any temperature, pressure, density, and correction factor data are load average based:



The wild stream amount indicated in the above display is the volume/mass of the wild stream product (blend stream product not included). The amount indicated is relative to the blend delivery type. If the blend stream meter is plumbed upstream of the wild stream meter, then the wild stream amount will be the amount measured by the wild stream meter, minus the equivalent volume type measured by the blend stream meter. When the pulse input for the wild stream is compensated, the above display will be the only value indicated for the wild stream product.

If the wild stream pulse input is compensated the following data will be available:



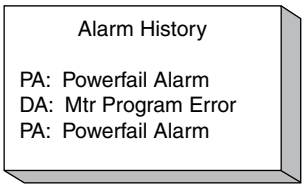
Run Mode Diagnostics

The run time diagnostics menu is accessed from either the Main Menu or the “Dynamic Displays” menu. It consists of the following entries:

- Active Alarms
- Alarm History
- Non-Resettable Volumes
- Event Log
- Transaction Log
- Audit Trail
- Digital Inputs
- Digital Outputs
- Analog Inputs
- Pulse Inputs
- Communications Monitor
- Download Directory
- Boolean Algebraic
- Transaction Archive Data
- Software Version
- Contrast Adjust

Alarm History

The Diagnostics menu provides the selection “Alarm History” where the most recent alarms can be viewed. With the arrow in front of “Alarm History,” press ENTER, and the historical alarms will be displayed. The alarms will be listed in order of occurrence.



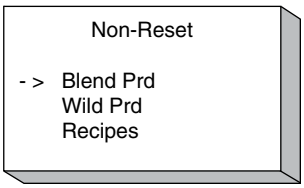
This is an alarm history for the transaction. For a more complete history of alarms, please access the “Event Log.”

Pressing the up and down arrow keys will allow the operator to page through the “Alarm History” displays. If “More…” is not displayed, then there is only one screen of alarms in the alarm history.

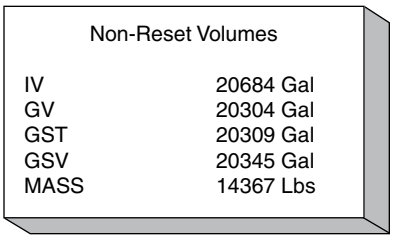
Pressing the CLEAR key will revert to the Diagnostic menu.

Non-Resettable Volumes

The Diagnostics menu provides the selection “Non-Reset Volumes” where the meter volumes can be viewed. With the arrow in front of “Non-Reset Volumes,” pressing ENTER will display a menu to allow the operator to view the meter or recipe volumes. Choosing either the meter or recipe by moving the arrow and pressing ENTER will either display the non-resettable volumes, or in the case of meter, which load arm.



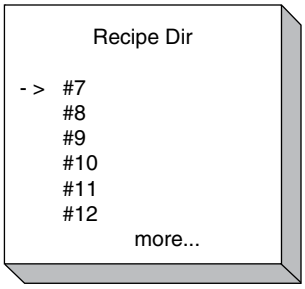
Meter volumes are displayed as follows:



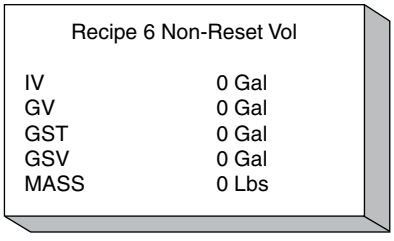
Pressing the CLEAR key will return the display to the Non-Reset Volumes screen.

Choosing “Recipes” from the “Non-Reset Volumes” menu results in the following screen:

To view the other six available recipes, simply scroll with the arrow keys up or down.

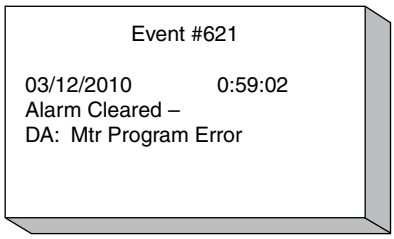


The following is displayed after the desired “Recipe” is selected by moving the arrow in front of the name and pressing ENTER:



Event Log

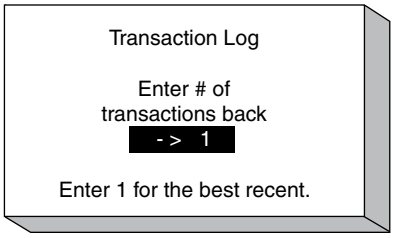
The “View Only” Diagnostics menu displays “Event Log” where past events can be viewed. With the arrow in front of “Event Log,” pressing ENTER will display the last event that occurred in the miniBlend.net. The “Event Log” includes alarms, transaction start and end, and “Program” Mode parameter changes.



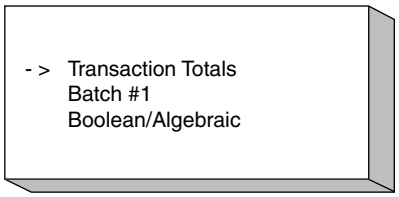
From the display, the operator can go back through the events using the up and down arrow keys. Pressing the CLEAR key will display the Diagnostics menu.

Transaction Log

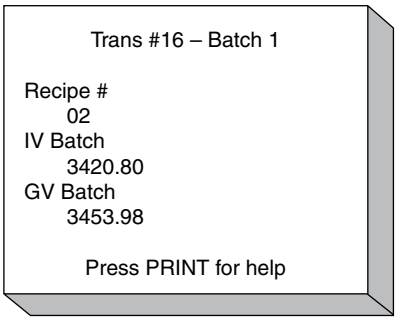
The Diagnostics menu provides the selection “Transaction Log,” where the transaction date can be viewed. With the arrow in front of “Transaction Log,” pressing ENTER will display the following:

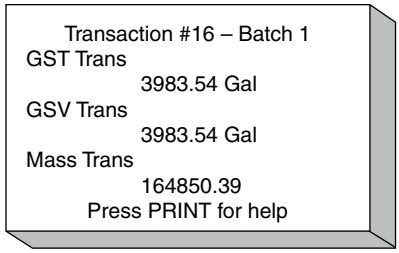


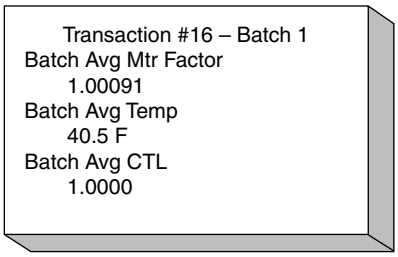
Entering the number of batches back, the miniBlend.net will display the following screen:

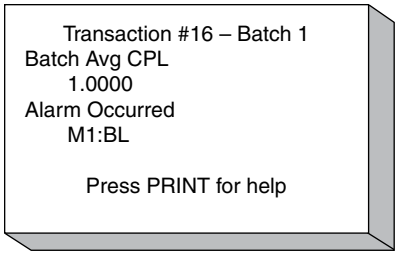


From this display, the operator can choose either “Transaction Totals,” “Batch Data” or “Boolean/Algebraic.” The following information is displayed for Batch #1:

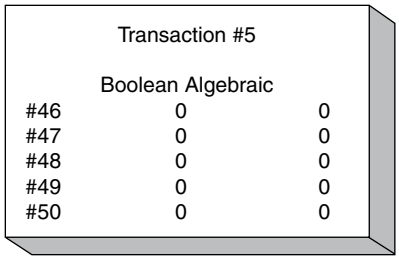




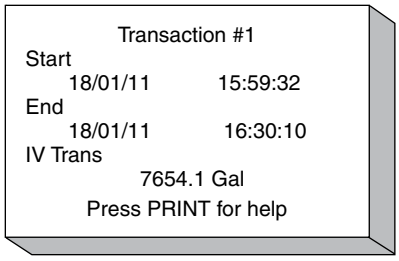


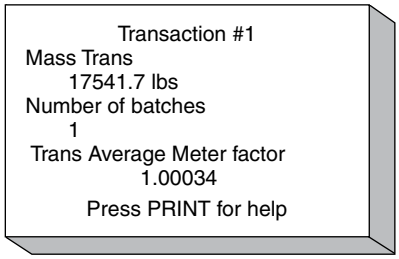


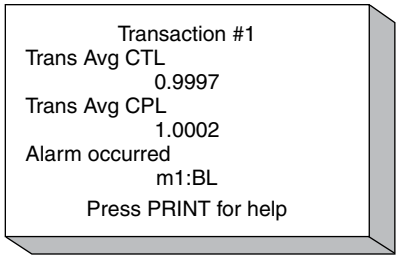
Boolean Algebraic

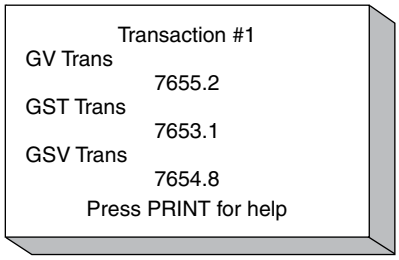


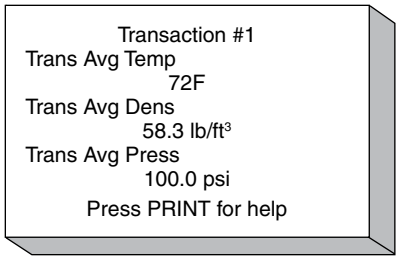
Transaction Totals





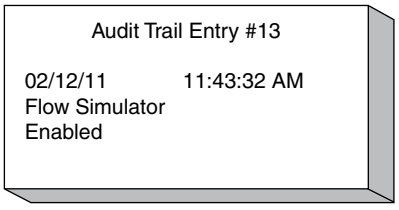




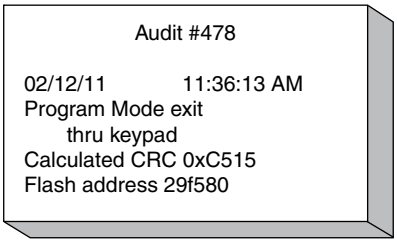


Audit Trail

The "View Only" Diagnostics menu provides the selection "Audit Trail" where audit trail data is available for viewing. With the arrow in front of "Audit Trail," pressing ENTER will display the last audit trail entry that occurred in the miniBlend.net.



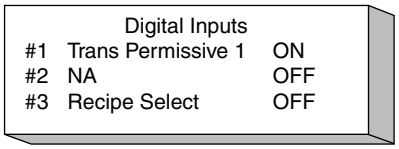
The audit trail provides the date, time, and description of "Program" Mode changes. Note that only changes to parameters secured at the two highest security levels programmed are logged in the audit trail. Pressing the up and down arrows on the keypad will allow the operator to step through the audit trail.



Pressing the CLEAR key will display the Diagnostic menu.

Digital Inputs

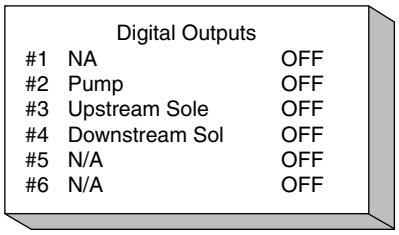
The Diagnostics menu provides for the selection of “Digital Inputs” where the current status of the digital inputs can be viewed. With the arrow in front of “Digital Input,” pressing ENTER will display the digital inputs, the programmed function, and their status.



Viewing the above displays provides information on digital input #1. It is used as a permissive and the current status is ON. Likewise, the functions and status of digital inputs #2 and #3 are also available. Pressing the CLEAR key will display the Diagnostics menu.

Digital Outputs

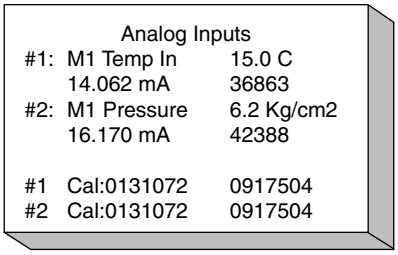
The Diagnostics menu provides the selection “Digital Outputs” where the function and status of the digital outputs can be viewed. With the arrow key in front of “Digital Outputs,” pressing ENTER will display all six digital outputs and their status.



Pressing the CLEAR key will display the Diagnostics menu.

Analog Inputs

The Diagnostics menu provides the selection “Analog Inputs,” where the function and status of the analog inputs can be viewed. With the arrow in front of “Analog Inputs,” pressing ENTER will display the two analog inputs, their current reading in engineering units, current, or voltage, and raw analog input value.

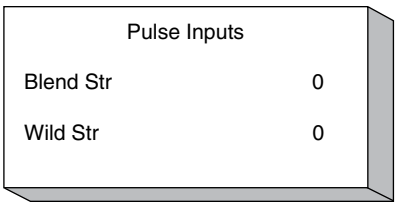


Pressing the CLEAR key will display the Diagnostics menu.

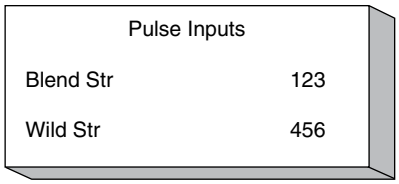
Pulse Inputs

The Diagnostics menu provides the selection “Pulse Inputs,” where the leakage pulses and the batch pulses are displayed. The leakage pulses are the pulses received when the valve is not told to open and no flow is authorized. Batch pulses are zero since no batch is in progress. With the arrow in front of “Pulse Inputs,” pressing ENTER will display the pulse inputs. Select meter pulse inputs or configurable pulse inputs.

If no transaction is in progress, the following display will appear:



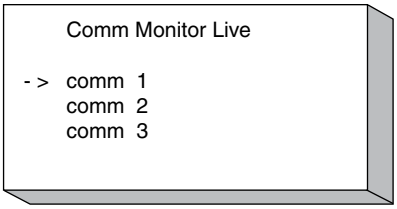
If there is a transaction in progress, the following display will appear:



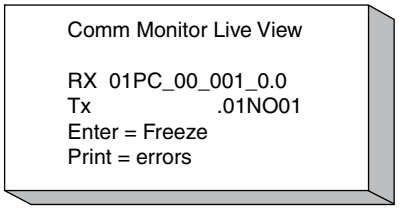
Pressing the CLEAR key will display the Diagnostics menu.

Communications Monitor

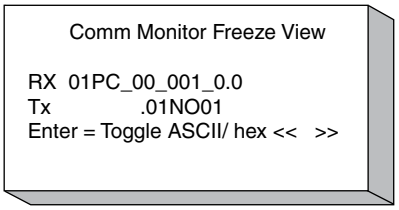
The Diagnostics menu provides the selection “Comm Monitor” to review messages being sent and received across the communications lines. With the arrow in front of “Comm Monitor,” pressing ENTER will display the following:



This display allows the operator to choose the communication port to be viewed. Pressing the ENTER key when the arrow is in front of the desired communications port will display the data that is being received by the MiniBlend.net and the response of the miniBlend.net.

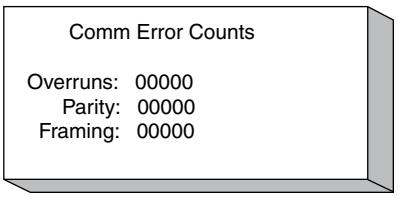


This display indicates that miniBlend.net address 01 received a PC command from the host and responded with a “no response,” indicating that it is in “Program” Mode. To freeze a command or response for further viewing, press ENTER.



On this display, the operator can toggle the message between the ASCII and hex characters. The decimal point key allows toggling between page scrolling (“<< >>”) and character scrolling (“< >”). To return to the previous display, press CLEAR.

Pressing the PRINT key in the live view will display the following screen:



From this display, the overrun errors, parity errors, and framing errors can be viewed. Pressing CLEAR will return to the “Live View” display.

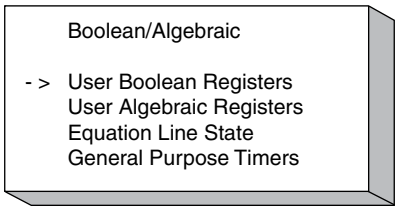
When completed, press CLEAR until the Diagnostics menu is displayed.

Download Directory

This directory will give a listing of all files that have been downloaded from the micromate. Some examples would be Translations, Configurable Bill of Lading Reports (factory default also), HTML Webpages, Driver Database, Boolean Equations, etc. Simply press ENTER on the menu to view the listing, and use the up and down arrows to navigate all downloads (if they exist). Press CLEAR to get back to the Diagnostics Menu.

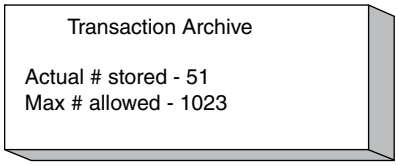
Boolean Algebraic

The Diagnostics menu provides the selection "Boolean Algebraic" to view Boolean/Algebraic registers and their results. General-purpose timers can also be viewed from this screen. With the arrow in front of "Boolean Algebraic," pressing ENTER will display the Boolean/Algebraic Processing menu.



Transaction Archive Data

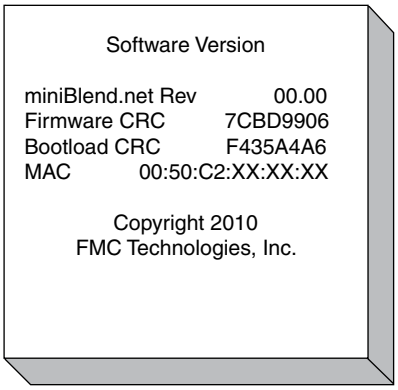
The Diagnostics menu provides the selection “Transaction Archive Data,” which allows the operator to view transaction data on the load arm. With the arrow in front of “Transaction Archive Data,” pressing ENTER will display the following screen:



Pressing CLEAR will return to the Diagnostics menu.

Software Version

The Diagnostics menu provides the selection “Software Version,” which allows the operator to view the version of software that is running in the MiniBlend.net. With the arrow in front of “Software Version,” pressing ENTER will display the software version, CRC, and MAC address.



Pressing CLEAR will return to the Diagnostics menu.

Automated Proving Mode

The “Automated Proving” Mode allows proving to be done on the blend stream product only. If the blend stream meter is plumbed upstream of the wild stream meter, a proving take-off valve must be plumbed in the system since the wild stream meter will remain closed during proving. During the prove, this valve is opened to allow product to flow into the proving unit.

Enabling of the “auto proving” can be programmed to require a digital input security contact to be closed, since it is possible for the meter factor to be altered.

When all the normal conditions are met for starting a transaction (pressing the SET key or receiving authorization via communications), the “Automated Proving” Mode will be activated.

If an automation system is in use, it may continue operating throughout the prove.

If configured, the Transaction Enabled digital output will become inactive. This will indicate that a blending transaction cannot take place until the Auto Prove “Program” Mode parameter is set to disabled.

The miniBlend.net will calculate the meter factor based on information obtained during the prove. The miniBlend.net will also calculate an average meter factor, if desired. This average will consist of no more than 10 factors from proving runs. The meter factor or average meter factor may be saved as a program parameter directly from the “RUN”mode without entering the “Program” Mode.

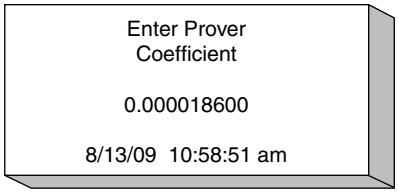
Keypad Functions Prove Mode

The pushbuttons on the keypad perform the following functions in the Proving Mode:

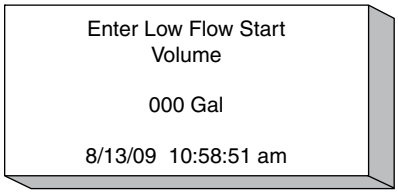
Key	Function
0-9	Used for entering numeric data, size of preset that may be used for proving
CLEAR	Used to clear incorrect entries and exit from dynamic displays
ENTER	Used for numeric entries and used for dynamic displays
PRINT	Used to end a proving transaction or transaction requiring 100% blend stream product
SET	Used to initiate a transaction when in prove mode
STOP	Used to stop delivery of blend stream product at any time (not intended as emergency stop)
Up Arrow	Used to navigate through the various data provided in the dynamic displays
Down Arrow	Used to navigate through the various data provided in the dynamic displays
Side Arrow	Used to navigate through the various data provided in the dynamic displays
F1	Not used
F2	Not used

Auto Proving Mode Operation

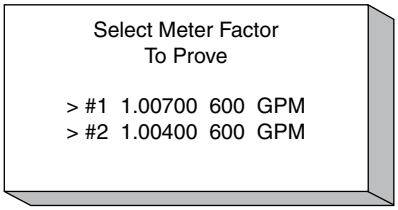
1. To initiate the proving sequence, proving must first be enabled in the program mode. When proving is enabled the SET, START, STOP, and PRINT keys will be enabled. The Ready screen will indicate “Proving Enabled” and prompt for the SET key to be pressed. At this point, there is a “yes” or “no” choice to “prove” using the Auto Prove function, or to just enter a preset batch mode for other alternative proving or flow purposes. If the selection of “yes” is chosen, the miniBlend.net will prompt for the prover coefficient of cubical expansion. Note that the most recent value for this entry will be displayed. If this value is acceptable, the operator need only press ENTER.



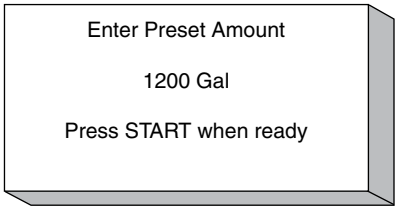
2. The miniBlend.net will prompt for the "Low Flow Start Volume." If Low Flow Start is not desired, enter zero. Note that the Low Flow Start rate used will be the one already entered in the "Program" Mode.



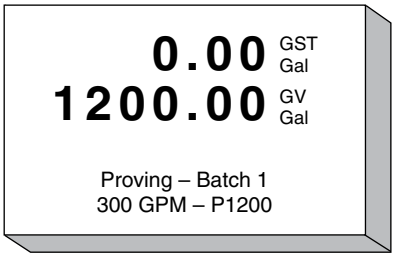
3. Select the meter factor to prove, if more than one meter factor is available.



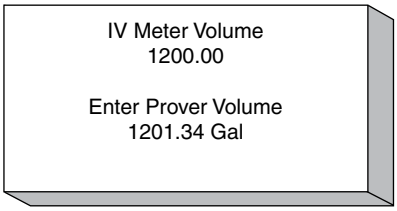
4. Enter the amount of blend stream product to be delivered for the prove.



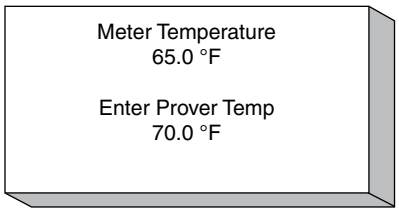
5. Press START to begin flow. The batch will be delivered. The flow rate will be adjusted to the flow rate selected above for proving. The flow rate ramp-down from first trip to the end of the batch will occur according to the parameters programmed in "Prove Control."



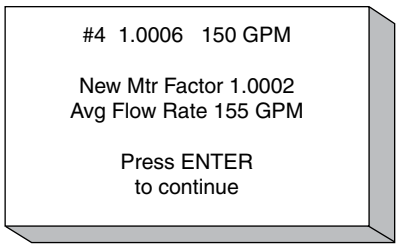
6. When the batch has completed, the miniBlend.net will prompt for the actual prover volume.



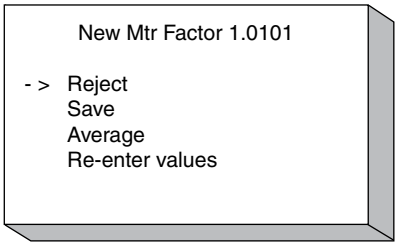
7. The miniBlend.net will prompt for the prover temperature.



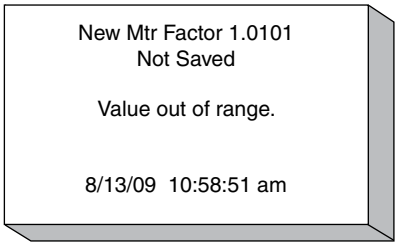
8. The miniBlend.net will then calculate the meter factor. The new meter factor will be displayed along with the average flow rate. Press ENTER to continue to next screen.



The operator may now select the “Save” option to save this new meter factor. If “Save” is selected, the miniBlend.net will store the newly calculated meter factor in the program mode. The operator may also select to reject this meter factor. If “Re-enter prove values” is selected, the operator will be able to view/edit entered prover volume and temperature.



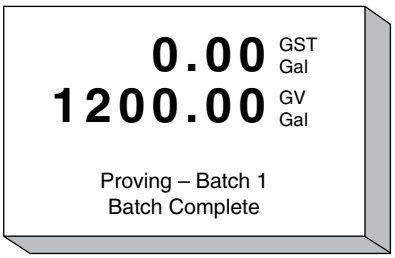
9. In the event that the meter factor is not successfully saved, (i.e. factor out of range), the following display will appear.



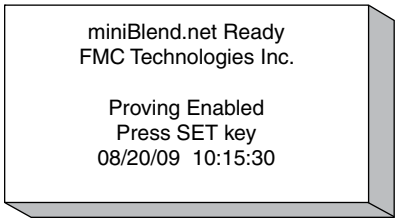
10. The operator may also select that the newly calculated meter factor be included in a running average of meter factors. (**Note:** A maximum of 10 proves may be included in the meter factor average.) Select “Average” to include the newly calculated meter factor in the running average.

The miniBlend.net will then average all meter factors in the buffer. The average meter factor will now be displayed. The operator may now select to “Save” the average or “Continue” proving. Select "Save" to store the average meter factor into the program mode. Select "Continue" to proceed with the next prove. If a power failure occurs while proving, any meter factors saved in the average buffer will be lost.

11. If a meter factor was saved, the miniBlend.net will go back to step 3 to allow the operator to select a new meter factor. Otherwise, the miniBlend.net will go back to step 4 to continue proving at this flow rate. (**Note:** If the miniBlend.net is in remote control mode, authorization is required for each batch.)
12. After the proving batch is completed and the new meter factor is either rejected or saved, the following screen will appear.



Pressing the Print key or issuing the end transaction communications command will return the display back to the ready display. A prove report can be printed if the unit is configured to print a report.



To place the miniBlend.net back to the blending ready mode display and to enable blending, “Program” Mode parameter “253 Auto Prove” must be programmed to “Disabled”.

Pulse Output

The function of the pulse output is to provide a way to indicate the amount of volume being recorded from a selectable meter. For every programmable volume amount, a pulse will be emitted. The volume type (IV, GRS, GST, GSV and Mass) is programmable. The pulse resolution is also programmable. Also, selectable for each output is a maximum frequency, which the output will not be allowed to exceed.

Nonresettable Totals

IV, GV, GST, GSV and Mass non-resettable totals are updated continuously during a transaction for the blend stream product and wild steam product where applicable. Rollover of each of the non-resettable totals occurs at 1 billion units. The non-resettable totals are not updated in-between transactions. Any leakage in-between transactions will be added to the non-resettable totals at the start of the next transaction.

Non-resettable totals are retained on power fail, and may only be reset to zero through use of the Diagnostic Menu. These totals may also be obtained through communications.

User Programmable Boolean/Algebraic Processing

Boolean processing will allow the user to define equations which can control digital outputs, set user defined alarms, stop a batch, and set flags in the database that are available to the user via communications.

Boolean equations will allow the user to control any of the digital outputs that are configured as a general purpose output. Outputs configured for other output functions can be altered by Boolean equations, but the miniBlend.net may override the current state when processing the function assigned to that output point.

The current state of any digital input point may be used in any of the user defined equations. The current value of the analog input may be used in any of the user defined equations.

Algebraic processing will be limited to algebraic comparisons only. Algebraic math functions will not be supported.

miniBlend.net commands existing in the database may also be controlled by the Boolean equations. Each of the commands existing in the database has a function associated with it. When the variable is written to, the function will be called. If the command is true, the corresponding action will be executed and then the database variable written to will be cleared. If the command is false, no action will be performed.

The following commands will be available for control by the user-defined equations:

- Set/clear user-defined alarm
- Energize/de-energize general purpose digital output

Reports

A configurable transaction report may also be downloaded to the unit from the BlendMate. The configurable report may be selected to be printed in place of the default report.

Default Transaction Report

```
PRODUCT RECEIPT TICKET  iiiiiiiiiiiiiiiiiii                              (Reprint)
----------------------
BILL OF LADING          Transaction Summary - #xxxx

dd-dd-dddd   tt:tt am


HM Classification: ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
ccccccccccccccccccccccccc

Customer:_____________________________________________________________________

Carrier:______________________________________________________________________

Operator:_____________________________________________________________________


            TRANSACTION TOTALS

            - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

            IV(uuu)   GRS(uuu) GST(uuu) GSV(uuu) MASS(uuu)          AVG TEMPS

            -------   -------  -------  -------  -------           ------------

ppppppppp   vvvvvvv   vvvvvvv  vvvvvvv  vvvvvvv  vvvvvvv           tttt.t (uuu)

ppppppppp   vvvvvvv   vvvvvvv  vvvvvvv  vvvvvvv  vvvvvvv           tttt.t (uuu)


TOTAL:      vvvvvvv   vvvvvvv  vvvvvvv  vvvvvvv  vvvvvvv


LOAD AVERAGES     Temp: tttt.t(uuu)    Dens: dddd.d(uuu)
                  Pres: pppp.p(uuu)    MFac: f.ffff


Alarms: HF1,LF2,HT1

This is to certify that the above named materials are properly classified, described,
packaged, marked, and labeled and are in proper condition for transportation accord-
ing to the applicable DOT regulations.




_____________________________________
Driver Signature


_____________________________________
Signature of Receiving Agent
```

Program Mode

The miniBlend.net has a significant number of customizable features which are selectable by the user. The process of selecting these features and customizing the miniBlend.net to each application is performed in the “Program” Mode. All programming information is entered via the keypad or through communications. This section will describe the procedure for entering via the keypad. The program codes for miniBlend.net are divided into several main directories, plus Diagnostics. The main directories and their contents are discussed in detail in the miniBlend.net Operator Reference Manual.

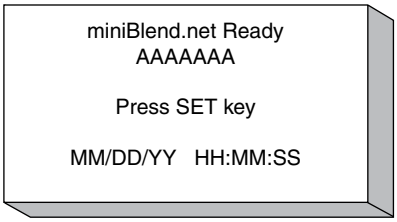
Keypad Data Entry

The pushbuttons on the keypad perform the following functions while the instrument is in the Program Mode:

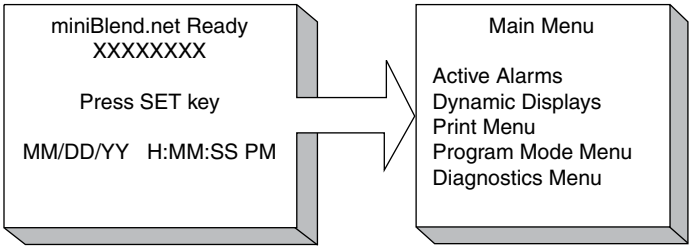
0 – 9	Used to enter the access code and for data entries
CLEAR	Used for clearing incorrect entries or for getting to an exit point
ENTER	Used to enter the “Program” Mode security access code, to enter the subdirectory, and to enter program data
START	Not used in “Program” Mode
SET	Page scrolling
PRINT	Used to access Help Messages
STOP	Used to set the security level
F1	Not used in “Program” Mode
F2	Not used in “Program” Mode
↑	Used to move up through the menus and rows for alphanumeric entries
↓	Used to move down through the menus and rows for alphanumeric entries
+/-	Used for adding signs to values being programmed
.	Decimal point, for values requiring one
← →	Used for alphanumeric entries

Entry to Main Directories

1. Assert the security input if configured. This will provide the first step for access to program codes.

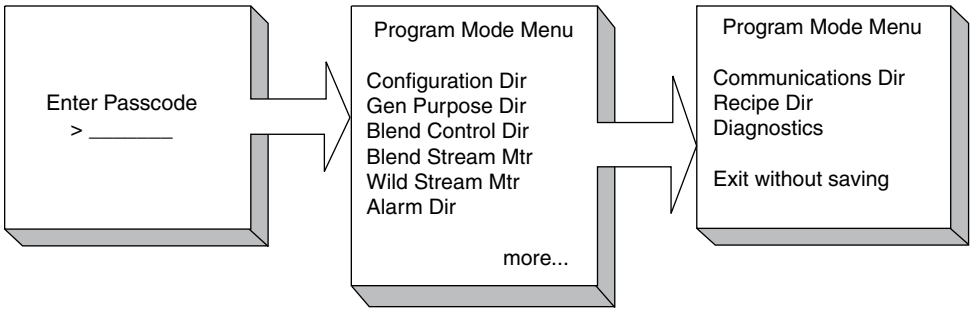


2. Press ENTER. This displays the main menu.



Accessing Main Menu

3. Move the arrow to the Program Mode menu and press ENTER. This will display the “Enter Passcode” screen.
4. Enter the access code. (The access code preset at the factory is “0.”) For security, any digit entered will be displayed as an “X.” (Access codes can be up to four digits long.)
5. Press ENTER. This procedure checks for the proper access code. If it is correct, the following will be displayed.
6. If an incorrect access code was entered, an “Access Denied, CLEAR = re-enter” message will appear. Press CLEAR to return the display to the “Enter Passcode Screen” in Step 3. Repeat Steps 3, 4, and 5 to re-enter “Program” Mode.



Opening Program Mode

Changing Program Mode Parameters

The program codes represent parameters that can be changed either to enhance the performance of the miniBlend.net, or to accommodate application changes. There are three types of parameters in miniBlend.net: codes that require numerical data, codes where an option can be selected from a list, and codes where alphanumeric data is entered. Once a code has been selected, change the programmed contents by entering a new value through the keypad.

Numeric Data

The numeric data is entered into the program codes via the keypad just as numbers are entered into a calculator. The number of digits for each entry is listed in the Reference section of this manual.

Alphanumeric Data

The parameters that require alphanumeric data are the codes that display Product Messages, Prompt Messages, or Permissive Messages on the displays of miniBlend.net, or provide information to be printed out on the Bill of Lading Emulation. When adding or changing information in these alphanumeric program codes, the keys listed below perform the following functions:

Key	*Description*
ENTER	Moves the character from the character set to the ID line. Also enters the data into the instrument's memory after END has been selected from the character set.
SET	Moves the cursor six positions to the right.
→	Used to move up through the menus and rows for alphanumeric entries.
←	Used to move down through the menus and rows for alphanumeric entries.
↑ and ↓	Selects the next block of characters. An example of this is changing from uppercase letter to lower case letters. The blocks of characters available in miniBlend.net are as follows: • A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # * • a b c d e f g h i j k l m n o p q r s t u v w x y z & @ • 0 1 2 3 4 5 6 7 8 9 < > ( ) ? ! . , ' - " / + = _ END

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Section X – Related Publications

The following literature can be obtained from FMC Technologies Measurement Solutions Literature Fulfillment at johno@gohrs.com or online at www.fmctechnologies.com/measurementsolutions. When requesting literature from Literature Fulfillment, please reference the appropriate bulletin number and title.

miniBlend.net

Specification ..... Bulletin SSMB001
Installation ..... Bulletin MNMB001
Operator Reference ..... Bulletin MNMB002
Operations ..... Bulletin MNMB003
Communications ..... Bulletin MNMB004
Modbus Communications ..... Bulletin MNMB005
BlendMate Installation/Operation ..... Bulletin MNMN006

Contact information is subject to change. For the most current contact information, visit our website at www.fmctechnologies.com/measurementsolutions and click on the "Contact Us" link in the left-hand column.

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