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Filter Controller

Next Flush
5:H 12:M

To adjust settings:

Step 1 Scroll to "Access Code" and press ✳

Step 2 Enter access code and then press ✳

Step 3 Scroll through menus and submenus by pressing "Up" or "Down" and press ✳ to view submenus.

Step 4 To edit a value press ✳, then use the "Up" or "Down" buttons to change the value. When finished editing, press ✳ to lock in the new value.

Step 5 To return to the top level menu, scroll either "Up" or "Down" to exit the submenu.

*e*MiniFlush

⚠ *Access By Qualified Personnel Only*

eMiniFlush Controller Ver 2.1

REVISION HISTORY

The eMiniFlush controller forms part of the TECHSYS range of filtration controllers, all designed to make filtration more reliable and economical..

TECHSYS Engineering

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SOFTWARE REVISION HISTORY

Current Edition   40.21.00

The Software version is a date stamped code with the first two numbers being the week of the year, the middle two numbers are the year and the last two being the minor revision.

CONTENTS

Version 1.0

1. EMINIFLUSH AT A GLANCE

- ❑ Enclosure IP65 – Polycarbonate – **150mmH x 150mmW x 90mmD**
- ❑ An industry proven dedicated filter backflush system with a rugged design to withstand harsh conditions.
- ❑ Capable of backflushing up to 4 filters plus a master valve OR 5 filters
- ❑ Real English Menus with a 2 Line 16 characters LCD Display.
- ❑ Easy navigation menu system with password access control.
- ❑ Backflush activation modes:
  - o Programmable Interval
  - o External digital differential pressure switch
- ❑ Two Power options:
  - o Replaceable batteries.
    - ▪ Battery condition and voltage is monitored and displayed.
    - ▪ Less than 0.000020 Amp (20uA) Power consumption
  - o 115VAC or 230VAC mains power.
- ❑ Automatic save of setting changes and collected data.
- ❑ Valve options:
  - o Battery powered controller.
    - ▪ 12VDC 2 Wire latching. (Valve pulse time is programmable)
  - o AC powered controller
    - ▪ 24VAC
    - ▪ 12VDC
    - ▪ 12VDC 2 Wire latching.
    - ▪ 24VAC motorized valve
- ❑ Current status indication.
  - o When interval only is selected the time until next backflush is displayed.
  - o When External DP only is selected, display shows "Waiting for Ext-DP "
  - o Faults or exceptions are intertwined with the interval/DP displays
- ❑ Data logging:
  - o Backflush Count
    - ▪ The total number of backflushes since last data log reset.
  - o Interval Backflushes
    - ▪ The number of interval backflushes since last data log reset.
  - o Ext-DP Backflushes
    - ▪ The number of Ext-DP backflushes since last data log reset.
  - o Interval Backflushes Last Hour
    - ▪ The number of Interval backflushes that occurred in the last hour.
  - o Ext-DP Backflushes Last Hour
    - ▪ The number of Ext-DP backflushes that occurred in the last hour.
  - o Last Interval Backflush
    - ▪ How long since the last interval backflush occurred.
  - o Last Ext-DP Backflush
    - ▪ How long since the last Ext-DP backflush occurred.
  - o Total Backflush Time
    - ▪ The total time the unit has spent back flushing.
  - o Total On Time
    - ▪ The total time the controller has been running.
  - o Time since power up last.
    - ▪ The time since the power was last turned on.
  - o Data log Reset
    - ▪ A special item that allows the operator to reset all values in the data log.
- ❑ Programmable delays:
  - o Between master valve and first backflush valve
  - o Between each filter.
  - o On initiation of a DP generated backflush sequence
  - o Filter Flow loss detection time
  - o Excess backflush flow detection time

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- ❑ Fault detection options:
    - ○ Maximum allowable backflushes per hour.
        - ▪ If exceeded there are four options:
            1. Do nothing.
            2. Stop backflushing. (If an output is set to activate on a Fault it will operate)
            3. Warning Alarm only (If an output is set to activate on a Fault it will operate)
            4. Warning Alarm and Stop backflushing. (If an output is set to activate on a Fault it will operate)
    - ○ Maximum consecutive backflush attempts initiated by differential pressure input.
        - ▪ If exceeded there are four options:
            1. Do nothing.
            2. Stop backflushing. (If an output is set to activate on a Fault it will operate)
            3. Warning Alarm only (If an output is set to activate on a Fault it will operate)
            4. Warning Alarm and Stop backflushing. (If an output is set to activate on a Fault it will operate)
- ❑ Manually initiated backflush sequence.
    - ○ The operator can initiate a backflush without having to wait for the time interval to expire or a DP situation to occur.
    - ○ All filters can be backflushed as per normal operation or an individual filter can be selected to backflush.
- ❑ Two Programmable Inputs. Each can be figured for one of the following tasks:
    - ○ Stop backflush cycle.
    - ○ Pause backflush cycle.
    - ○ Start backflush via Ext-DP or Initiated signal (Delayed activation via programmable setting).
    - ○ Reset for any current faults.
    - ○ Loss of system flow.
    - ○ Excessive backflush flow
- ❑ User programmable outputs
    - ○ All valve outputs not required for normal valve operation are programmable. Options are:
        - ▪ Disabled
        - ▪ Any filter valve including duplicating existing filter valve outputs
        - ▪ Fault *
        - ▪ No Fault *
        - ▪ Backflushing On *
        - ▪ Not Backflushing *
        - ▪ * = Not available when used with latching valves
- ❑ Interface ports for optional SCADA and extended memory.

2. QUICK START

1

- Connect the back flush and master valves (if fitted) to the output terminals as detailed in the OUTPUTS section; disable all unused outputs.
- Set Inputs to the required settings.

Always turn off the power to the unit when opening and use a qualified electrician when working with mains level voltages.

2

AC Mode
Plug power lead into Power Outlet

OR

Battery Mode
Place fresh alkaline batteries into the battery holder inside the case.

3

Scroll through the menus. Set the access code, then change settings/configuration for the intended site.

Set the:
- Type of power supply (AC or Battery)
- Set type of valves used
- Enable required valve/s

Check protection settings.
- Maximum backflushes per hour
- Maximum backflush attempt for each DP event

4

Set time values:
- BackFlush time
- BackFlush interval
- Master Valve Dwell Time
- Inter-Filter Dwell Time
- Differential Pressure Start Delay.
- Valve Latching pulse duration for Battery Mode

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3. INTRODUCTION

The TECHSYS eMiniFlush Controller is designed to automatically backflush filters on either a time or as required basis. The controller is a microprocessor based system. This technology allows the operator to scroll through Menus that can be changed to suit each site or application.

Run LED
AC Mode -
flashes continuously
Battery Mode -
Only flashes when awake.

Display screen
Currently showing the main Status screen.
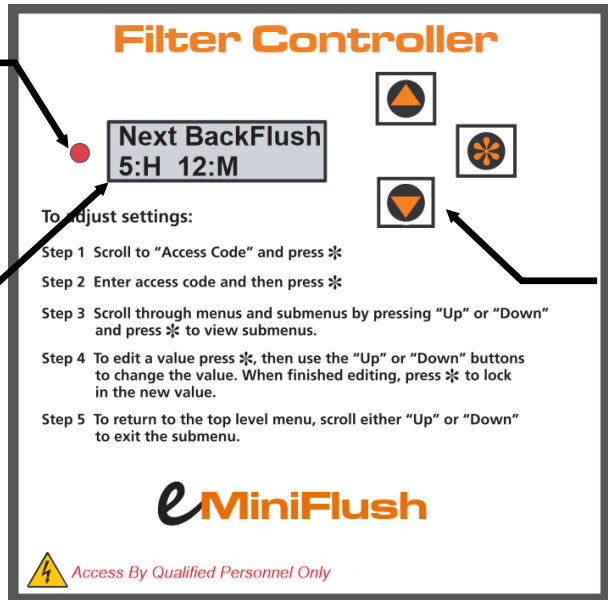
Operator keys

The controller has a list of menu items that allow adjustment of the filter back flushing. The menus are accessed by pressing the "UP" or "DOWN" keys.

To scroll through the main menu options, press the up or down key to view the list of menus available.

To view all adjustable Menus the correct Access Code must be entered.
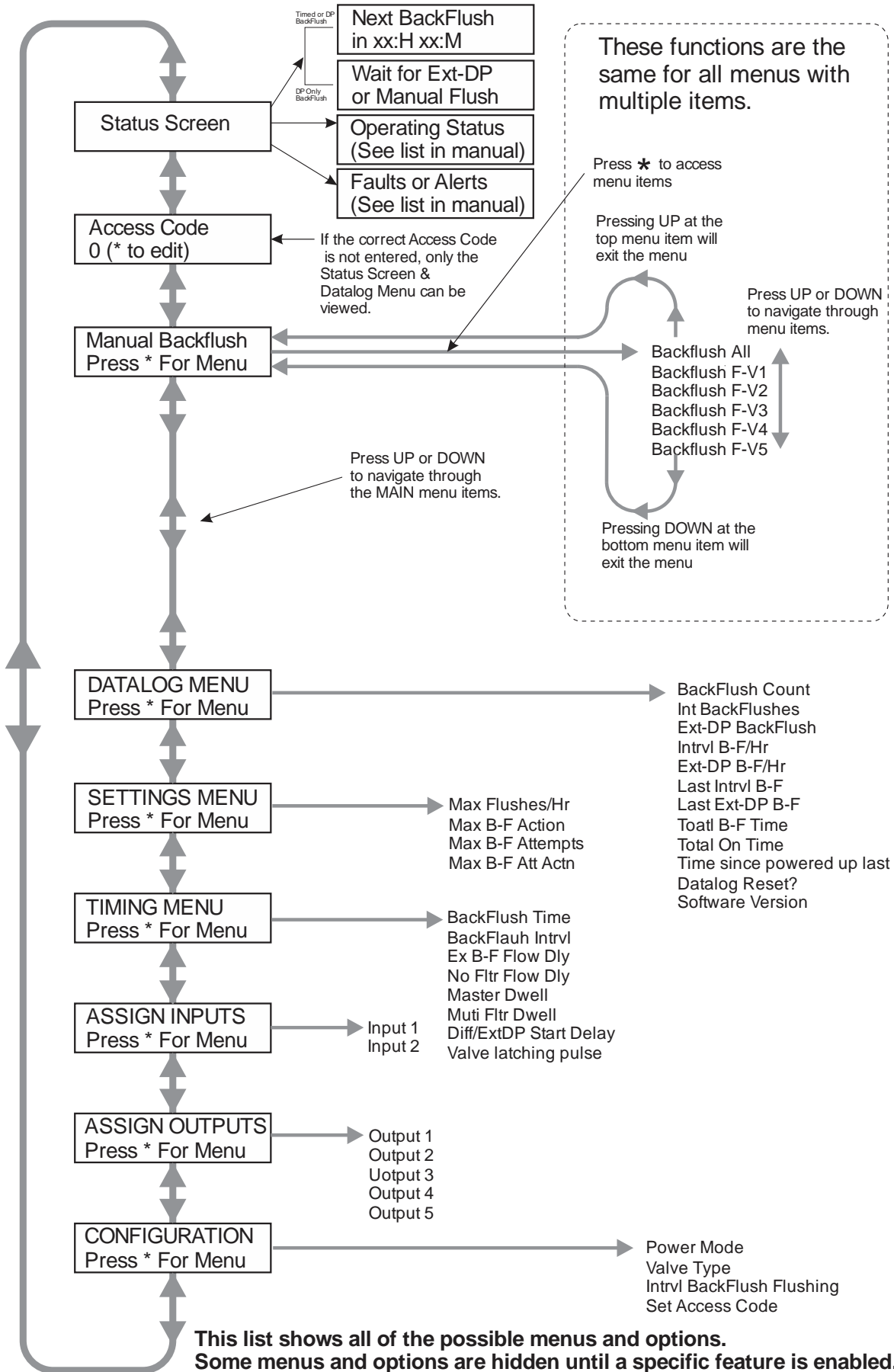From the status screen press the "DOWN" key once. When the Access Code screen is displayed press the *"STAR" (Edit) key, the number will now start to flash, press the "UP" key until the correct access code has been entered, press the * key again to lock in the access code. Now all menus will be visible. Press "UP" or "DOWN" keys to scroll through the menus.

To access one of the main menus press the * key, then press the "DOWN" key to view the options within that menu. To edit the value of the menu item, press the * key when the required menu is displayed and then press the "UP" or "DOWN" key depending on the value required. When the required value has been set, press the * key again to lock the new valve in.
To exit any menu, scroll "UP" until the top of this menu reached or "DOWN" until the bottom is reached. Either will exit back to the entry point of the menu. The same applies for all menus.

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4. MENU STRUCTURE

Status Screen

Timed or DP BackFlush
- Next BackFlush in xx:H xx:M

DP Only BackFlush
- Wait for Ext-DP or Manual Flush
- Operating Status (See list in manual)
- Faults or Alerts (See list in manual)

These functions are the same for all menus with multiple items.

Press ✱ to access menu items

Pressing UP at the top menu item will exit the menu

Press UP or DOWN to navigate through menu items.

Access Code 0 (✱ to edit)

If the correct Access Code is not entered, only the Status Screen & Datalog Menu can be viewed.

Manual Backflush Press ✱ For Menu

- Backflush All
- Backflush F-V1
- Backflush F-V2
- Backflush F-V3
- Backflush F-V4
- Backflush F-V5

Pressing DOWN at the bottom menu item will exit the menu

Press UP or DOWN to navigate through the MAIN menu items.

DATALOG MENU Press ✱ For Menu

- BackFlush Count
- Int BackFlushes
- Ext-DP BackFlush
- Intrvl B-F/Hr
- Ext-DP B-F/Hr
- Last Intrvl B-F
- Last Ext-DP B-F
- Toatl B-F Time
- Total On Time
- Time since powered up last
- Datalog Reset?
- Software Version

SETTINGS MENU Press ✱ For Menu

- Max Flushes/Hr
- Max B-F Action
- Max B-F Attempts
- Max B-F Att Actn

TIMING MENU Press ✱ For Menu

- BackFlush Time
- BackFlauh Intrvl
- Ex B-F Flow Dly
- No Fltr Flow Dly
- Master Dwell
- Muti Fltr Dwell
- Diff/ExtDP Start Delay
- Valve latching pulse

ASSIGN INPUTS Press ✱ For Menu

- Input 1
- Input 2

ASSIGN OUTPUTS Press ✱ For Menu

- Output 1
- Output 2
- Uotput 3
- Output 4
- Output 5

CONFIGURATION Press ✱ For Menu

- Power Mode
- Valve Type
- Intrvl BackFlush Flushing
- Set Access Code

**This list shows all of the possible menus and options.
Some menus and options are hidden until a specific feature is enabled.**

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5. FILTER APPLICATIONS

The eMiniFlush Controller is suitable for use with numerous types of filters. Please consult your local TECHSYS representative to confirm the specific application.

6. TOP LEVEL MENU ITEMS

Top Level Menu Item	Access Code Required	Notes
Next BackFlush in XX:M XX:S	NO	Status Screen 1 –See Note1
Wait for ext-dp or manual flush	NO	Status Screen 2 –See Note2
Batt: (Status description) XX.XX volts	NO	Good, Okay, Replace, Low –See Note3
ACCESS CODE 0 (* to edit)	NO	Default: 21
MANUAL BACKFLUSH Press * for menu	YES	
DATALOG MENU Press * for menu	NO	
SETTINGS MENU Press * for menu	YES	
TIMING MENU Press * for menu	YES	
ASSIGN INPUTS Press * for menu	YES	
ASSIGN OUTPUTS Press * for menu	YES	
CONFIGURATION Press * for menu	YES	

Note1. The "Next Backflush" status screen is only visible when "Interval Backflushing" is enabled.
Note2. This is the main status screen when "Interval Backflushing" is disabled and an external or Differential Pressure switch or sensor is used to initiate the backflush.
Note3. The Battery condition is only displayed when operating in battery mode, it will alternate displaying with other screen.

See detailed descriptions for each of the sub menu items in the follow sub sections.

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7. STATUS MENU ITEMS

The eMiniFlush controller provides various status menu items for the operator. The status menu will automatically cycle through the current status items (the operator can also press * to manually cycle through the status menus)

Next BackFlush in XX:M XX:S	**Wait for Ext-DP or manual flush**

When the eMiniFlush controller is switched on the operator will be presented with one of these two status items. Also after 5 minutes of operator inactivity the unit will reset the access code to zero and display the status screen.

If interval backflushing has been enabled the "Next backflush" status item will be displayed. The time remaining until to the "Next Backflush" will continue to count down unless the pause or stop input has been asserted.

If interval backflushing has been disabled the "Wait for Ext-DP" status screen will be shown. This indicates the system is waiting for an external flush input, or for the operator to trigger the backflush from the "manual backflush" menu.

The eMiniFlush controller will display the battery status screen when the controller has been configured for "Battery Power Mode".

**Batt: Good
12.83 volts**

On the first line of the display you will see "Batt: NN", where NN is one of "Good", "Okay", "Replace", "Low". This indicates the general condition of the battery.
When large latching solenoid valves are used the indicated battery condition may change from "Replace" to "Low" after operation but return back to "Replace". This is normal and the batteries should be replaced soon.
On smaller valves there will be a considerable amount of useable life in the battery when "Low" is indicated.

When a backflush has been triggered the status screen will indicate what has initiated the backflush.
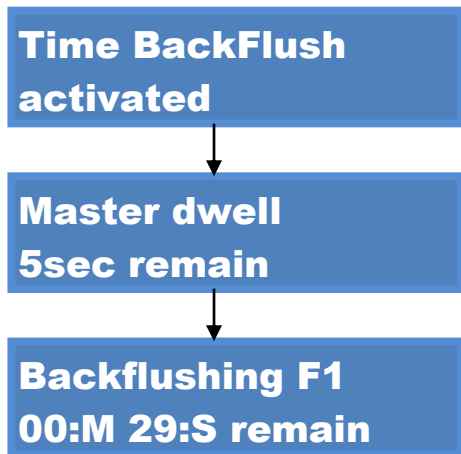
Manual BackFlush activated

Time BackFlush activated

Ext-DP BackFlush activated

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During a backflush the status menu will keep the operator informed of what the current state of the backflush is.

For Example:

```
Time BackFlush
activated
        |
        v
Master dwell
5sec remain
        |
        v
Backflushing F1
00:M 29:S remain
```

There are other status menu items that will indicate why the unit may have stopped back flushing.

Stop Input has been activated

When an input has been configured as Stop and that input has been activated the system will turn off all valves and stop backflushing. The interval timer will be reset and when the input is removed the interval timer will start to count down again.

Pause Input has been activated

When an input has been configured as pause and the input has been activated all valves will turn off and the interval back flushing timer will pause. When the input is removed the backflush valves will turn back on and backflushing will continue from the point at which it was paused.

B-F /Hr Exceeded Press * to Reset

The controller tracks the number of backflushes per hour and also the number of backflush attempts per continuous "Ext-DP" input signal. Both these safe guards can be configured in the "SETTINGS" menu.

Attempt Limit Press * to Reset

The purpose of these functions is to give the user the option to prevent continual backflushing should the Differential Pressure or External Backflush signal be continually asserted. If the "Action" for these items is set to "Stop", the controller will cease all backflushing and thus prevent excess water from being dumped to drain. If the "Action" for these items is only set to "Alarm" then the message will be displayed but the controller will continue to backflush.

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8. ACCESS CODE

The eMiniFlush controller requires an access code to either manually cause a backflush or to change any setting. A user without an access code is able to view the status screens and the "DATALOG" menu only. The default access code is 21 but can be changed by the user. If you forget your access code you will be able to reset it by contacting your supplier for further help.

ACCESS CODE
0 (* to edit)

To enter your access code scroll through the menus until you see this screen (By pressing either "UP" or "DOWN")
After you have scrolled to the "ACCESS CODE" menu, the next step is to press the "*" - this enables the editing mode.

ACCESS CODE
0 (* to save)

The 0 will now begin to flash. If you press either the "UP" or "DOWN" keys the flashing value will be incremented or decremented. In most menus holding the "UP" or "DOWN" keys will cause the value to change by a larger amount. However this feature is disabled in the access code menu.

After you have entered the correct access code the next step is to save the access code. This is accomplished by pressing the "*" key once more. The number on the screen will stop flashing and the "UP" and "DOWN" keys will again allow you to scroll through the menus. The access code will only be saved for 15 minutes after the last key press, then it will be reset to 0 and will have to be entered again if further access is required.

9. MANUAL BACKFLUSH MENU

MANUAL BACKFLUSH
Press * for menu

The manual backflush menu allows the operator to initiate a backflush on all valves or an individual valve. The manual backflush will run for the configured back flush time. Press "*" to enter the Manual backflush menu.

Press * to flush all filters.

BackFlush All
Press * to start

If only one filter needs to be backflushed then press the down key until the desired filter is shown. Any filter/s not assigned to an output will be skipped and not displayed.

BackFlush F1
Press * to start

When the desired filter number is displayed press the * key to start. If an output has been assigned as a master valve it will operate along with the selected filter.
If an individual filter is backflushed the master valve delay will also operate and the prescribed master dwell delay will occur.

BackFlush F2
Press * to start

BackFlush F3
Press * to start

Note: Five filters can be implemented if no Master valve is used.

BackFlush F4
Press * to start

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10. DATALOG MENU

**DATALOG MENU
Press * for menu**

The eMiniFlush controller stores information about how often and when back flushes have occurred. To enter the DATALOG scroll through the menus until you see the "DATALOG" menu, then press "*" to enter the menu.

- Backflush Count
  The total number of backflushes since last datalog reset.

  **Backflush Count
  xx total**

- Interval Backflushes
  The number of interval backflushes since last datalog reset.

  **Int Backflushes
  xx**

- Ext-DP Backflushes
  The number of Ext-DP backflushes since last datalog reset.

  **Ext-DP Backflush
  xx**

- Interval Backflushes Last Hour
  The number of Interval backflushes that occurred in the last hour.

  **Intervl B-F/Hr
  xx**

- Ext-DP Backflushes Last Hour
  The number of Ext-DP backflushes that occurred in the last hour.

  **Ext-DP B-F/Hr
  xx**

- Last Interval Backflush (Minutes & Seconds)
  Tine since the last interval backflush occurred. If the elapsed time is more than one hour it will display Hours & Minutes

  **Last Intrvl B-F
  xx:M yy:S ago**

- Last Ext-DP Backflush (Minutes & Seconds)
  Time since the last Ext-DP backflush occurred. If the elapsed time is more than one hour it will display Hours & Minutes

  **Last Ext-DP B-F
  xx:M yy:S ago**

- Total Backflush Time (Minutes & Seconds)
  The total time the unit has spent back flushing. If total time is more than one hour it will display Hours & Minutes.

  **Total B-F Time
  xx:M yy:S**

- Total On Time (Hours & Minutes)
  The total the unit has been running.

  **Total On Time
  xx:H yy:M**

- Time since powered up last. (Hours & Minutes)
  The time elapsed since the power has been turned on.

  **Xx:H yy:M Since
  Powered up last**

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- Datalog Reset
  A special item that allows the operator to reset all valves in the datalog. This is achieved by pressing the "*" key while this menu item is on screen. This screen is not visible unless the correct access code has been entered.

**Datalog Reset?
Press * to reset**

- Software Version
  This screen displays the current software version. It may be helpful in determining if any further software upgrades are available and should be quoted when calling the technical support line.

**Software Version
40.21.00**

To exit the datalog menu, scroll "UP" until the top of this menu reached or "DOWN" until the bottom is reached; either will exit back to the entry point of the DATALOG MENU.

11.   SETTINGS MENU

**SETTINGS MENU
Press * for menu**

The settings menu has system limits and the action required when these system limits have been exceeded.

This defines the max number of backflushes allowable in a one hour window. The next menu item defines what should happen if this limit has been exceeded. This option is useful in preventing a blocked filter or damaged filter from causing excess flushing. If Interval and Differential backflushing are both active this will be the combined total of both.
.

**Max flushes/hr
XX max**

Where XX is: None, Stop, Alarm or Alarm+Stop.
If the Max Flushes/hr limit is exceeded the system will either continue backflushing or stop depending on this setting.

- If this option is set to none the limit will be totally ignored and backflushing will continue when required.

**Max B-F Action
None**

- If set to Stop the controller will stop backflushing and a fault message will be displayed on the status screen. No fault output will be activated.

**Max B-F Action
Stop**

- If set to Alarm a message will be display but the controller will continue to backflush when required. If an output is programmed to be fault it will also be activated.

**Max B-F Action
Alarm**

- If set to Stop+Alarm a message will be displayed and the controller will cease to backflush filters. If an output is programmed to be fault it will also be activated.

**Max B-F Action
Stop+Alarm**

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Maximum Backflush Attempts places a limit on the number of consecutive backflush attempts that should normally occur via an external differential pressure switch input. If the External Differential input is not automatically released after a backflush has occurred and another backflush is therefore initiated this counter will increment. This continues until the "Max B-F Attempts" is exceeded or if the External Differential input is released. Once this limit has been exceeded the eMiniFlush controller will respond according to the setting in the max backflush attempts action menu (Max B-F Attn Action).

**Max B-F Attempts
X max**

The options are:

- If this option is set to none the limit will be totally ignored and backflushing will continue when required.

**Max B-F Att Actn
None**

- If set to Stop the controller will stop backflushing and a fault message will be displayed on the status screen. No fault output will be set.

**Max B-F Att Actn
Stop**

- If set to Alarm a message will be display but the controller will continue to backflush when required. If an output is programmed to be fault it will also be activated.

**Max B-F Att Actn
Alarm**

- If set to Stop+Alarm a message will be displayed on the status screen and the controller will stop all backflushing. If an output is programmed to be fault it will also be activated.

**Max B-F Att Actn
Stop+Alarm**

12. TIMING MENU

**TIMING MENU
Press * for menu**

The timing menu configures the various timed functions and parameters.

The Backflush time defines how long each filter is to be backflushed. If greater than 59:M 59S the display will change to display Hours and Minutes. XX:H XX:M. The maximum backflush time is 1 Hour per filter. When using two standard 24VAC or 12VDC valves, the absolute maximum cumulative Backwash time should be one (1) hour and if set at one hour the Backwash interval should be set to one (>1) hour or greater. EG: 60 min / 4 Filters = 15Mins max Backflush time per filter. A chart in the specifications sections give further guidance on applicable times and for other conditions.

**Backflush time
XX:M XX:S /Fltr**

When Interval Backflushing is enabled this setting defines the interval between backflush sequences.
If greater than 59:M 59S the display will change to display Hours and Minutes. XX:H XX:S. If greater than 23:H 59M the display will change to Days and Hours. XXD XXH. The maximum interval setting is 7 Days.

**Backflush Intrvl
XX:M XX:S**

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If one of the programmable inputs is set to activate from a flow switch in the backflush line to detect excessive waste water then this menu will be visible. It needs to be set to a time that is considered sufficient for all filters to have finished a backflush cycle. If flow is detected via a flow switch in the waste line for a period greater than the set value, the controller will cease all backflushing. If an output is programmed to be Fault, it will also be activated and the fault output can be used to turn off pump operation.

Ex B-F Flow Dly
XX:M XX:S

If one of the programmable inputs is set to activate from a system flow switch to detect loss of filter flow, then this menu will be visible. If no flow is detected via a flow switch in the filter supply line for a period greater than the set value, the controller will cease all backflushing. If an output is programmed to be fault it will also be activated.

No Fltr Flow Dly
XX:M XX:S

The eMiniFlush controller has the capacity for one master valve output and up to four filter valve outputs. The Master Dwell time defines how long after the master valve is opened before opening the first filter backflush valve.

Master Dwell
XX:M XX:S

The Inter-Filter dwell defines how long after a filter valve is turned off before the next filter valve is turned on.

Inter Fltr Dwell
XX:M XX:S

This setting configures how long the eMiniFlush controller requires the "External Differential Pressure Switch" Input to be asserted before a backflush is triggered.

Diff/ExtDP Start
Delay: x sec

If in battery mode, this menu will be displayed as it is assumed that low powered latching valves will be used to conserve battery usage. The valve latching pulse is the duration required for latching solenoid valves to properly latch either open or closed. Please check the valve manufacturer's datasheet for the required duration, or contact your supplier for further information. Pulse times larger than necessary may
cause the valve not to operate correctly and/or will reduce battery life.
If latching valves are to be used when used in AC Mode, then simply select the Latching Valve option in the Valve Type menu.

Valve latching
Pulse: XX.Xmsec

13.   ASSIGN INPUTS MENU

ASSIGN INPUTS
Press * for menu

The eMiniFlush controller has two configurable inputs. Both inputs can be configured/assigned to a number of different optional modes. The same options apply for both inputs.

- Disabled
  The Input has no function.

Input X
Disabled

- Stop
  When an input is configured as a Stop input and the input is asserted the controller will stop and cancel any current interval or differential input backflush for the duration that the input signal asserted. When the input is released and another backflush occurs the sequence will start from the first filter again.

Input X
Stop

- Pause

Input X
Pause

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When an input is configured as a pause input and the input is asserted the controller will turn off the master valve and any current filter backflush valve and also pause the filter backflush timer. When the input is released, the appropriate filter valve/s will be re-activated and the backflush timer restarted. However if there was no current backflush in progress, the controller will simply stop the interval timer and prevent any further backflushes until the pause input is released.

- Ext-DP Flush
The Ext-DP Flush input option allows an external differential pressure switch or remote system to cause a backflush. There is a delay associated with the activation of this input to prevent false triggering.

Input X
Ext-DP Flush

- Reset Faults
This option allows a remote system to reset any faults.

Input X
Pause

- B-F Flow SW N/O
The Backflush flow switch option allows connection of a flow switch in the filter drain line which is used to detect excessive backflushing or defective valves which may inadvertently cause the wasting of water. The N/O (normally open) feature allows flow switches to be used which close when flow is detected.

Input X
B-F Flow SW N/O

- B-F Flow SW N/C
The Backflush flow switch option allows connection of a flow switch in the filter drain line which is used to detect excessive backflushing or defective valves which may inadvertently cause the wasting of water. The N/C (normally closed) feature allows flow switches to be used which open when flow is detected.

Input X
B-F Flow SW N/C

- Filtr Flow SW N/O
The Filter flow switch option allows connection of a flow switch in the filter supply line which is used to detect the loss of flow to the filter. The N/O (normally open) feature allows flow switches to be used which close when flow is detected.

Input X
Fltr Flow SW N/O

- Filtr Flow SW N/C
The Filter flow switch option allows connection of a flow switch in the filter supply line which is used to detect the loss of flow to the filter. The N/C (normally closed) feature allows flow switches to be used which open when flow is detected.

Input X
Fltr Flow SW N/C

14. ASSIGN OUTPUTS MENU

ASSIGN OUTPUTS
Press * for menu

The eMiniFlush controller has five (5) outputs; each output can be configured/assigned to a different function.

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The default configuration is:
Output 1 = Master Valve
Output 2 = Filter 1
Output 3 = Filter 2
Output 4 = Filter 3
Output 5 = Filter 4

If no master valve is used, five filters can be used.
Output 1 = Filter 1
Output 2 = Filter 2
Output 3 = Filter 3
Output 4 = Filter 4
Output 5 = Filter 5

The options shown below are the functions that every output can be configured to. The outputs are numbered 1 to 5 from left to right when looking at the connection terminals – See output connection for more information. NOTE: When in Battery mode or when latching valves are used, only filter/valve functions can be applied to the outputs.

- Disabled
  If an output has no function it should be disabled. All outputs not being used should be disabled. The disabled function can also be used to temporarily disable a filter whilst it is out of service.
  Any filter that is disabled will be skipped during a backflush.

**Output X
Disabled**

- Master Valve
  The master valve turns on at the start of the backflush cycle and turns off at the end. Master valves are typically used to redirect or increase flows during the backflush cycle. Output 1 is normally programmed to be the Master Valve. If a Master Valve output is not required this output can be Disabled or programmed to another function. (See other non-filter options below)

**Output X
Master Valve**

- Filter Valve 1
  Filter valve 1 turns on at the same time as the master valve. There is also an adjustable timer to delay the operation of filter valve 1. It is called the Master Dwell and is used to give the master valve time to operate before operating any filter valves. Output 2 is normally programmed to be Filter Valve 1.

**Output X
Filter Valve 1**

- Filter Valve 2
  Filter valve 2 turns on after filter valve 1. There is also an adjustable timer to delay the operation between filter valves - it is called the Inter Filter Dwell and is used to give the previous valve time to close before operating the next filter valve. Output 3 is normally programmed to be Filter Valve 2.

**Output X
Filter Valve 2**

- Filter Valve 3
  Filter valve 3 turns on after filter valve 2. There is also an adjustable timer to delay the operation between filter valves - it is called the Inter Filter Dwell and is used to give the previous valve time to close before operating the next filter valve. Output 4 is normally programmed to be Filter Valve 3.

**Output X
Filter Valve 3**

- Filter Valve 4
  Filter valve 4 turns on after filter valve 3. There is also an adjustable timer to delay the operation between filter valves - it is called the Inter Filter Dwell and is used to give the previous valve time to close before operating the next filter valve. Output 5 is normally programmed to be Filter Valve 4.

**Output X
Filter Valve 4**

- Filter Valve 5
  Filter valve 5 turns on after filter valve 4. There is also an adjustable timer to delay the operation between filter valves - it

**Output X
Filter Valve 5**

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is called the Inter Filter Dwell and is used to give the previous valve time to close before operating the next filter valve. Filter five can be utilized if there is no master valve. For ease of wiring all filters would be moved along (Output 1 = Filter 1, Output 2 = Filter 2 etc to Output 5 = Filter 5) but it's strictly not a requirement. Any filter can be assigned to any output and they will still be operated sequentially from filter 1 to filter 4/5.

- Fault **
  If an output is programmed to be a Fault output it will activate whenever the controller detects a fault. Some faults can shut down backflushing; others are for indication only. When the fault is reset the output will turn off.

> **Output X**
> **Fault**

- No Fault **
  If an output is programmed to be a No Fault output, it will activate when the controller is fault free and deactivate when a fault is detected.

> **Output X**
> **No Fault**

- Backflushing **
  If an output is programmed to be a Backflushing output it will activate whenever the controller is running a backflush cycle.

> **Output X**
> **Backflushing**

- Not Backflushing **
  If an output is programmed to be a Not Backflushing output it will activate whenever the controller is NOT running a backflush cycle and deactivate when it is backflushing.

> **Output X**
> **Not Backflushing**

** These options are not visible or available when operating in Battery mode or AC Mode when latching valves are used.

15.   CONFIGURATION MENU

> **CONFIGURATION**
> **Press * for menu**

The Power Mode setting allows internal settings to be reconfigured according to the power source used.

- In AC Mode: This mode is used when an AC power module is included. The display is always on and the update rate is increased to allow for faster response.

> **Power Mode**
> **AC Mode**

- In Battery Mode: This mode is used when a battery power module is included. The display turns off after a few seconds and the system sleeps to conserve battery power. This mode should be used in conjunction with low powered latching solenoid valves.

> **Power Mode**
> **Battery Mode**

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Valve Type is used to select the correct voltage to suit the valves being used. NOTE: this menu is not shown when operating in battery mode and the outputs automatically default to latching valves.

- Select when standard 24VAC solenoid valves are to be used.

**Valve Type
24 VAC**

- Select when standard 12VDC solenoid valves are to be used.

**Valve Type
12 VDC**

- Select when 9-30VDC latching solenoid valves are to be used. The valve pulse time will also need to be set.

**Valve Type
Latching**

The timed backflush feature can be "Enabled" or "Disabled". Set to Disabled if Differential only backflushing is required.

- Enabled: Interval and differential input backflushing possible.

**Intrvl backflush
flushing: Enable**

- Disabled: Differential input only backflushing possible.

**Intrvl backflush
flushing: Disable**

This option allows you to change the default access to code to a site specific access code. Please make a note of this access code as forgetting this access code will require you to contact your distributor for assistance.

**Set Access Code
XX**

16.   INITIALIZATION MESSAGES

When the eMiniFlush controller powers up there are some messages that are for information purposes only.

**Micro Flusher
S/W V: XXXXXXX**

Normally this is the only start up message displayed, showing the current firmware version.

**NO CONFIGURATION
PRESS INIT P-B**

However if new software has been installed this message will be displayed - NO CONFIGURATION. To rectify this a full initialization is required.
To perform a full system reset please see section SYSTEM RESET.
If this occurs sometime after the controller has commissioned, please advise your distributor as soon as possible.

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17. TERMINAL CONNECTIONS

The eMiniFlush controller requires that some terminals be connected to allow for optional features to be used.

Initialize Key

SCADA Expansion Port Connectors

Pressure sensor Inputs

2 Digital Inputs

Valve Outputs. 3 Common terminals & 5 Outputs.

24VAC Valve Power Supply

12VDC Valve/Power Supply
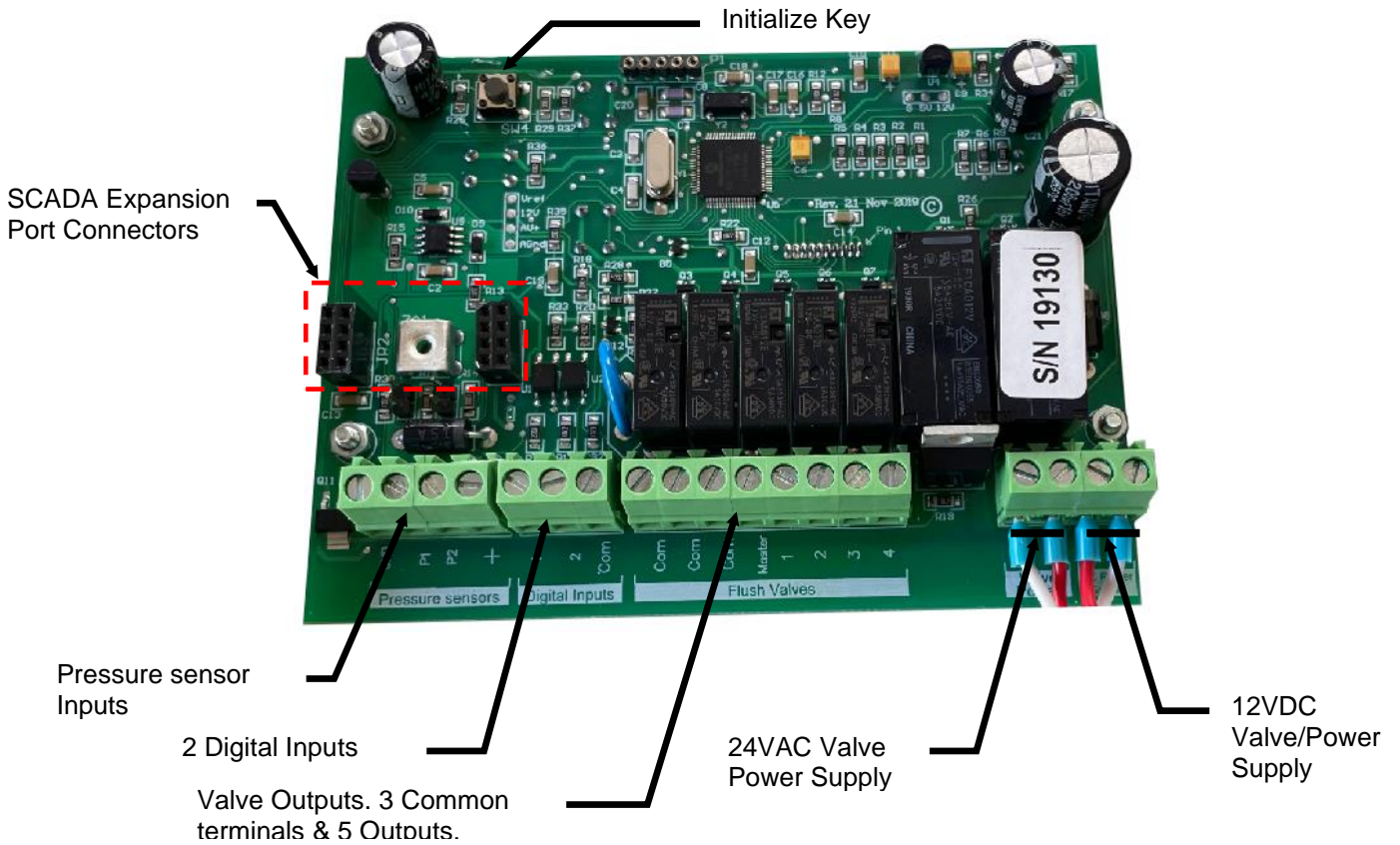
18. POWER CONNECTIONS

All the power terminals are located on the bottom right edge of the circuit board and are labelled.

24VAC Valve Power Supply

12VDC Valve/Power Supply. Polarity sensitive.
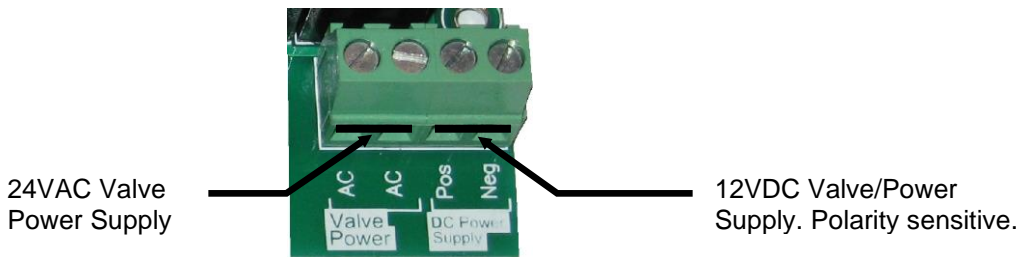
The eMiniFlush controller can be powered by 8 AA batteries (12VDC) or an AC Power module that supplies 12VDC to the DC valve/power input. When the controller is powered by only a DC power supply then only 9-30VDC latching valves must be used. If powered by the AC power module then 24VAC OR 12VDC or 9-30VDC latching valves can be used.

The correct power supply module needs to be used and the "Power Mode" and "Valve Type" setting in the "CONFIGURATION" menu needs to be set according to the type of valve used.

Valve type	Voltage	Power Mode setting	Power supply module
Standard (Non latching)	24VAC	AC Mode	AC Module
Standard (Non latching)	12VDC	AC Mode	AC Module
Latching	9-30VDC	AC Mode OR Battery mode	AC Module OR Battery Module

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19.   INPUTS

The eMiniFlush Controller has two programmable inputs for external control:

Input 1

Input 2

Input Common
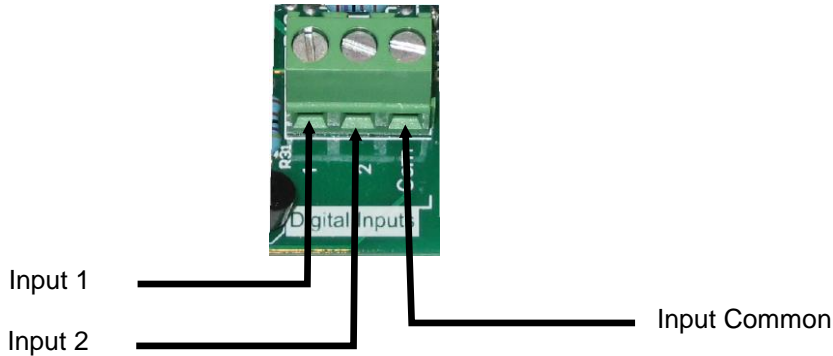
These inputs are Voltage free – do not apply voltage to the inputs.

N.O
Normally
Open Switch

N.C
Normally
Closed Switch
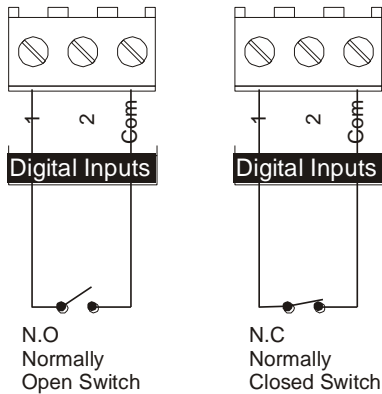
19.1. DISABLED

If an input is not used it should be set to disabled.

19.2. STOP

When an input is set to stop the controller it will stop any current backflush in progress and prevent any further backflushing. When the stop signal is removed backflushing can resume at any time and will start from filter 1.

19.3. PAUSE

When an input is set to pause the controller will pause any current backflush countdown in progress and turn off all valves that are currently on. When the pause signal is removed the valves that were on prior to the pause will be turned back on and backflushing will resume at the point where it was prior to the pause. Whilst the pause input is on no further backflushing will occur.

19.4. EXT-DP FLUSH

The external differential pressure input is used in conjunction with an adjustable differential pressure switch with a voltage free output. Differential pressure switches work by measuring the pressure before and after the filter. When this pressure exceeds the set differential pressure the contacts should close in the switch which initiates a system backflush.

Safe guards exist to prevent over flushing and water wastage. See the settings section of this manual (Max Flush /Hr and Max Flush Attempts)

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This input can be used by any external device with voltage free contacts to initiate a backflush.

19.5.   RESET FAULTS

If an input is programmed to reset faults an external system can be used to remotely reset any current fault conditions

19.6.   B-F FLOW SW N/O

Setting an input to operate in conjunction with a flow switch that is monitoring the backflush water will allow the controller to detect backflush flows that occur after a backflush event has occurred. Used in conjunction with a fault output, it allows the system to activate an output to alert someone or connect the output in a way that will shut down the water supply to the filter. There is a delay timer associated with this function. When backflushing ceases, if the flow switch detects flow in the backflush line the timer will start; if the flow continues past the Ex B-F Flow Dly time setting then a message will appear on the screen and an output can be activated. An input will need to be set to B-F Flow SW mode before the Ex B-F Flow Dly timer appears in the timing menu. N/O – Normally Open switch (Closes when water is detected)

19.7.   B-F FLOW SW N/C

Same as above but used in conjunction with flow switches that only have normally closed contacts. N/C – Normally Closed switch (Opens when water is detected)

20.   OUTPUTS

The eMiniFlush Controller has five programmable outputs, each can be configured to a different function. The default or normal settings are for a Master and four Filter Valve operation. See the Configure Output Menu section for more information on changing output options.

The default/normal configuration is:
Output 1 = Master Valve
Output 2 = Filter 1
Output 3 = Filter 2
Output 4 = Filter 3
Output 5 = Filter 4

3x Output Commons

Output 1 –Master Valve

Output 5 – Filter Valve 4

Output 4 – Filter Valve 3

Output 3 – Filter Valve 2

Output 2 – Filter Valve 1
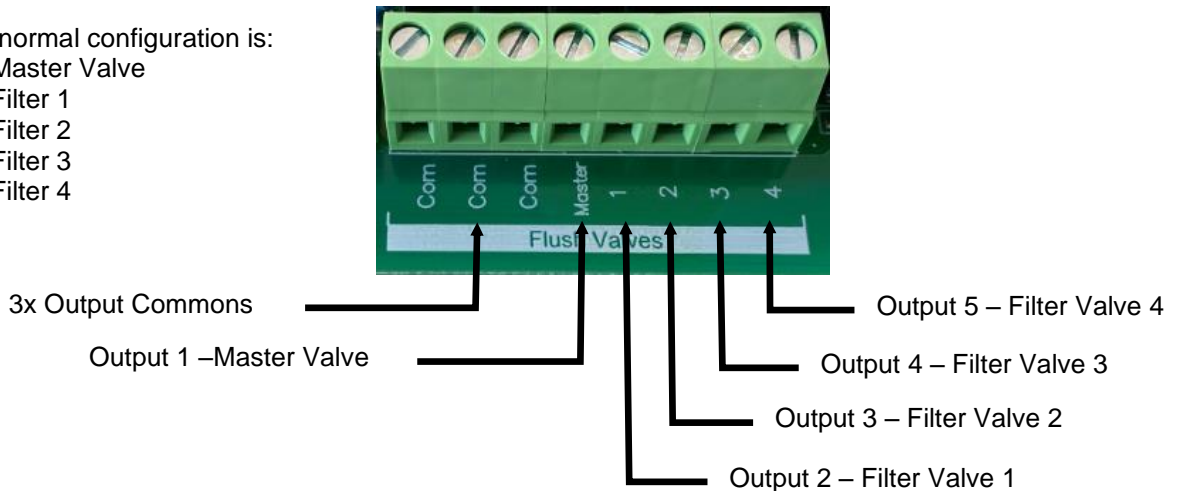
TYPICAL CONNECTIONS:

MASTER VALVE AND ONE FILTER   TWO FILTERS (Output 1 disabled)
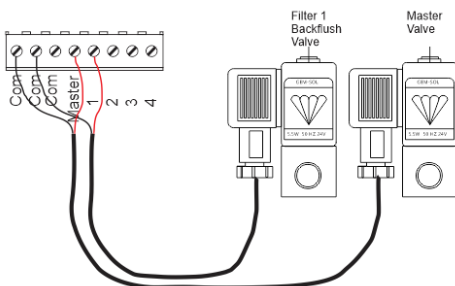
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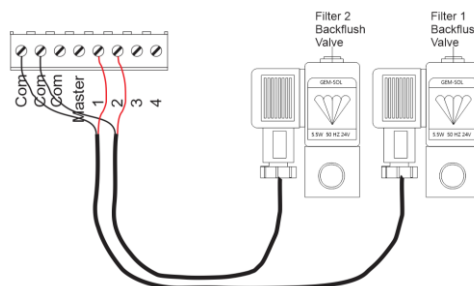
21.   FAULT OUTPUT

UTILISING AN OUTPUT TO OPERATE THE VOLTAGE FREE RELAY WHICH IS INCOPORATED ON THE AC POWER BOARD.

In the image below, Output 1 is changed from being a Master valve to Fault/Backflushing indication operation. Output 1 along with any Valve Common is connected to the Voltage Free Relay input. The relay has changeover contacts and is rated at 10A. Note – the wiring is polarity sensitive.
Any spare output can be programmed to operate when there is a fault or just to indicate the eMiniFlush is back flushing.

Valve Common must be connected to VC
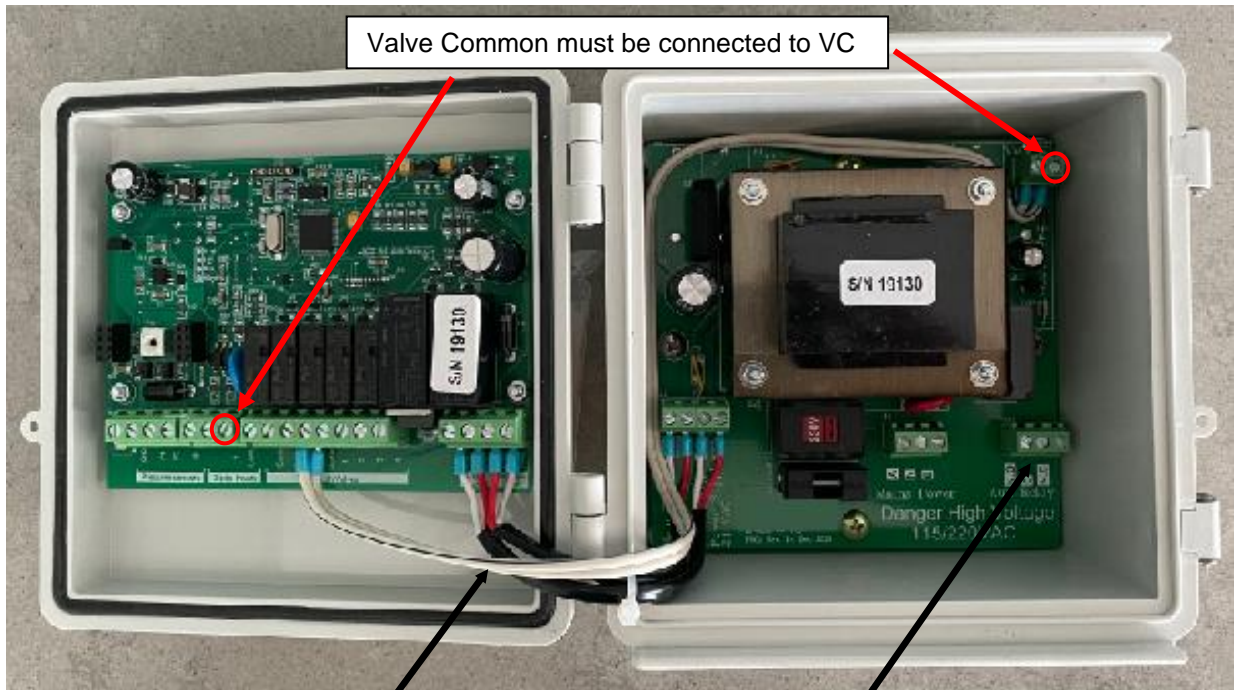
Wiring required to enable voltage free output relay to operate.

AUX Relay terminals. Voltage free changeover contacts

22.   SYSTEM RESET

A full system reset can be performed by turning off the power to the controller. Wait 30 seconds, hold down the Initialize Key and then turn the power back on. When Storing Data is displayed release the Initialize key.

Initialize Key

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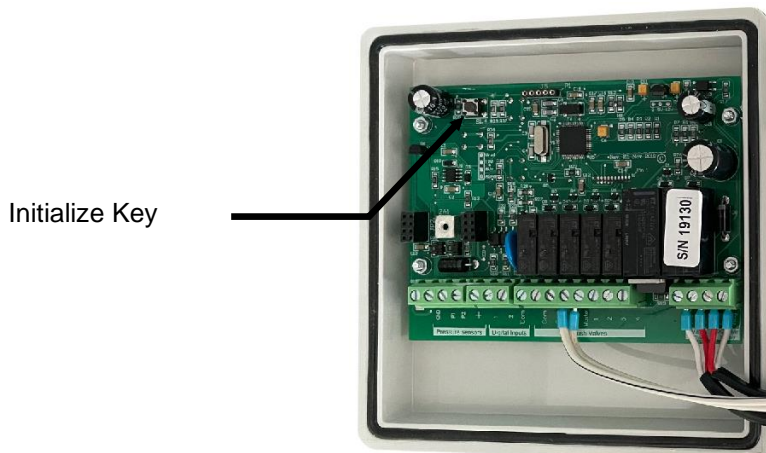
23. SPECIFICATIONS & STANDARDS

SPECIFICATIONS

Power input	115VAC OR 230VAC
Input power frequency – AC Voltage	48-62Hz
Valve outputs	Absolute Maximum -12VDC @ 2.0A, 24VAC @ 1.2A
Operating Temperature	45C @ (Max 60mins total filter flush time with 60mins or more between flushes)
Installation Environment	100% shaded, no direct sunlight. Also avoid mounting on walls with direct sunlight.
Maximum power output	25 watts
Storage Temperature range	-10 to 70degC
Relative humidity range	to 90% non condensing
Enclosure rating	IP65
Output Relays	3 amp rating Mechanical life 20×10^6 cycles Electrical life 1×10^5 cycles
Enclosure Size	150 X 150 X 90

There are limits on how many valves can be used and how long the eMiniFlush can activate standard solenoid valves. The limitation is due to the internal power supply size and dissipation of the heat generated by the internal transformer. The chart below provides some guidance to the absolute maximum combined filter backflush time and interval between backflush's to enable the eMiniFlush to operate up to an ambient temperature of 45C. 1x Valve implies there is no Master valve used. 2x Valves could be 2 valves per output OR 1 master valve with 1 valve per output. If the system requirements are outside of these time constraints, then consider using latching valves.

Valve Type	Max total Backflush time	Minimum Backflush Interval
1x 24VAC	18 Hours per filter	No minimum
2x 24VAC	1 Hour. All filters combined	1 Hour
	30 Mins. All filters combined	30 Mins
	15 Mins. All filters combined	15 Mins
1x 12VDC	18 Hours per filter	No minimum
2x 12VDC	1 Hour. All filters combined	1 Hour
	30 Mins. All filters combined	30 Mins
	15 Mins. All filters combined	15 Mins
Latching Valves	18 Hours per filter	No minimum

Note: These limits are defined when the eMiniFlush is operating in a maximum ambient temperature of 45C in full shade and not mounted on a wall that has direct sunlight that could also heat up the controller.

As can be seen from the above chart, operating two solenoid valves simultaneously has time limitations. The absolute maximum continuous valve actuation time for all filter combined on a single backflush cycle is one hour, the time then to the next backflush should be at least one hour but preferably longer. The general rule of thumb when operating two solenoid valves is the interval between backflush cycles should be equal or greater than the combined valve/filter backflush time.
EG: 40 Minutes between backflush cycles (Backflush Interval) with four valves/filter each backflushing for 10 Minutes. -OR less but NOT more.

If in doubt on any of the operating requirements as listed above, please contact your local distributor.

24. INDEX

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