**API Documentation**

# Commands

*A NULL value should be replaced with a 0 (char. Zero) when writing the command*

## Prime

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **PRIME** | CHEM\_WASH | 1-8 (0,10) | -T | <sec> | -R | 36 |
| -C | 1-8 (10) |

### ARG1

|  |  |
| --- | --- |
| CHEM\_WASH | The “CHEM\_WASH” flag tells the system to prime wash to the corresponding channel (1-8) in var1 versus the reagent.  *If var1 is set to 0, this will prime the wash line but not each channels individual wash lines.*  *If var1 is set to 10, this will prime all of the channels’ wash lines starting with 8 down to 1.* |
| -C | The “-C” is a channel selection for reagents. Var1 will correspond to the reagents in channel 1-8.  *If var1 is set to 10, the system will prime all reagents.* |

### ARG2

|  |  |
| --- | --- |
| -T | The “-T” sets the mode to be time based. This makes var2 an input in seconds. |

### ARG3

|  |  |
| --- | --- |
| -R | The “-R” sets the mode to be rate based.  *This should always be set to 36, any values outside of this are not tested.* |

## Wash

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **WASH** | -C | 1-8 | -T | <sec> | -R | 36 |
| CHEM\_WASH | NULL |
| COLLECTION |
| COMMON |
| ALL |

### ARG1

|  |  |
| --- | --- |
| CHEM\_WASH | *Washes all chemical channels.* |
| -C | *Washes a specific chemical channel based on VAR1* |
| COLLECTION | Washes the common line all the way out to the collection/waste. |
| COMMON | Washes the common line up to the GFET chip. |
| ALL | Washes all runs (in order): CHEM\_WASH, COMMON, COLLECTION |

### ARG2

|  |  |
| --- | --- |
| -T | The “-T” sets the mode to be time based. This makes var2 an input in seconds. |

### ARG3

|  |  |
| --- | --- |
| -R | The “-R” sets the mode to be rate based.  *This should always be set to 36, any values outside of this are not tested.* |

## Purge

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **PURGE** | ALL | NULL | -T | <sec> | -R | 36 |
| COMMON |

### ARG1

|  |  |
| --- | --- |
| ALL | Air purges from the air vent out to the collection/waste. |
| COMMON | Air purges from the air vent to before the GFET chip. |

### ARG2

|  |  |
| --- | --- |
| -T | The “-T” sets the mode to be time based. This makes var2 an input in seconds. |

### ARG3

|  |  |
| --- | --- |
| -R | The “-R” sets the mode to be rate based.  *This should always be set to 36, any values outside of this are not tested.* |

## Collect

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **PRIME** | -C | 1-8 (0,9) | -T | <sec> | -R | 36 |

### ARG1

|  |  |
| --- | --- |
| -C | Selects what channel to use for collection.  *1-8*: Normal reagent channels  *0*: Wash  *9*: Air |

### ARG2

|  |  |
| --- | --- |
| -T | The “-T” sets the mode to be time based. This makes var2 an input in seconds. |

### ARG3

|  |  |
| --- | --- |
| -R | The “-R” sets the mode to be rate based.  *This should always be set to 36, any values outside of this are not tested.* |

## Pump

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **PRIME** | -C | 1-8 | -T | <sec> | -R | 36 |

### ARG1

|  |  |
| --- | --- |
| -C | Selects which channel to pump from. |

### ARG2

|  |  |
| --- | --- |
| -T | The “-T” sets the mode to be time based. This makes var2 an input in seconds. |

### ARG3

|  |  |
| --- | --- |
| -R | The “-R” sets the mode to be rate based.  *This should always be set to 36, any values outside of this are not tested.* |

## Wait

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **OP** | **arg1** | **var1** | **arg2** | **var2** | **arg3** | **var3** |
| **WAIT** | -T | <sec> | NULL | | | |

### ARG1

|  |  |
| --- | --- |
| -T | Var1 sets how long to wait for in seconds. |

# Example Script

|  |
| --- |
| %% Setup device PURGE ALL 0 -T 30 -R 36 PRIME CHEM\_WASH 0 -T 10 -R 36 PRIME CHEM\_WASH 8 -T 5 -R 36 PRIME CHEM\_WASH 10 -T 10 -R 36 PRIME -C 10 -T 5 -R 36 WASH COMMON 0 -T 10 -R 36 WASH COLLECT 0 -T 10 -R 36  %% Start of sequence PUMP -C 1 -T 15 -R 36  WASH CHEM\_WASH 0 -T 5 -R 36  WASH COMMON 0 -T 10 -R 36 PUMP -C 8 -T 15 -R 36 WASH CHEM\_WASH 0 -T 5 -R 36  WASH COMMON 0 -T 10 -R 36 PUMP -C 5 -T 30 -R 36  WASH CHEM\_WASH 0 -T 5 -R 36  WASH COMMON 0 -T 10 -R 36 PUMP -C 2 -T 30 -R 36  WASH CHEM\_WASH 0 -T 5 -R 36  WASH COMMON 0 -T 10 -R 36 COLLECT -C 0 -T 100 -R 36 |

Text in black is a command. Text in red is a note.

# Script Writing Tips

* Washing after pumping chemicals
  + To prevent the chance of backflow, it is recommended to wash the chem channel that just pumped and then run a common wash after every pump operation.
* Proper first priming of wash
  + To properly prime the wash for all chemical channels, you should first PRIME CHEM\_WASH using the argument 0 then 8 and finally you can run the full prime using 10.
* Proper first priming of chemical channels
  + After you run PRIME -C 10, you should run a full wash of the system to ensure there is no backwash. You should WASH CHEM\_WASH and then WASH COMMON.

# Calibration Tips

* To figure out the correct timing for priming, it is recommended to test with de-ionized water.
* Prime times
  + **Reset the System with an Air Purge:**
    - Run the first calibration script to reset the system by performing an air purge for at least 100 seconds.
    - If liquid still appears in the output to waste after the purge, repeat the script until the system is fully cleared of liquid.
  + **Prime the Test Chemical Channel:**
    - Run the second calibration script to prime your test chemical channel for 100 seconds.
    - While the script is running, start a stopwatch.
    - Stop the stopwatch as soon as liquid starts flowing through the waste line.
    - The total time recorded on the stopwatch, plus an additional 2 seconds, will be the correct prime time for this chemical channel.
  + **Repeat for Wash Prime Channel 8:**
    - For the final step, prime **Channel 8** with wash.
    - Follow the same procedure: reset the system with an air purge, then prime Channel 8 with wash for 100 seconds.
    - Start a stopwatch and stop it once liquid starts flowing through the waste line.
    - The total time recorded on the stopwatch, plus 2 seconds, will be the correct prime time for wash in Channel 8.
* Choosing your -R value
  + While the system was tested with -R 36, the usable range is anything below this. If the system is pumping fluid too fast, you can cut the speed roughly in half by dropping 36 to 18.
  + The -R value should not go above 36, this is the highest tested flow rate and anything higher might result in a blowout due to pressure build up in the fluidic system.