**Outgoing messages**

Periodic sample

* JSON format
* Mandatory fields:
  + “id” (“redurchin”)
  + Reading (“voltage” or “raw”)
    - “voltage” is a voltage in nanovolts
    - “raw” is the averaged raw integer reading from the ADC - it is not adjusted by the PGA gain
* Optional fields
  + “temperature” (in C)
  + “gain” (of the PGA)
  + “rate\_hz” (the output rate of this message)
  + “missed\_reading”, if sent, indicates that a reading from the ADC was not received, or was incorrectly formatted, since the last sample was sent
  + “missed\_send”, if sent, indicates that at least one sample was not sent since the last message
  + “timestamp\_ms” (since bootup)
* Example:  
  {"id":"redurchin","voltage":1.443549720,"temperature":28,"timestamp\_ms":1273762,"gain":1.0,"rate\_hz":1000}

Command response

* JSON format
* Confirms handling of an incoming message
* Mandatory fields
  + “command\_response” – either “OK” or “ERROR”
  + “command” – the command that was processed

Calibration voltage response

* JSON format
* Each calibration table will generate a single message
* Mandatory fields
  + “calibration” – a string value of “voltage”
  + “gain” – a float value of the gain associated with this table
  + “points”
    - Contains 5 subfields, each with the following keys
      * “raw”
      * “err”

Calibration temperature response

* JSON format
* One message for the temperature calibration
* Mandatory fields
  + “calibration” – a string value of “temperature”
  + “slope”
  + “intercept”

**Incoming messages**

|  |  |
| --- | --- |
| DARK | Turns off the user LEDs |
| RAW | Sets the output mode to “raw” |
| RATE:XXXX | Sets the output rate of the periodic sample (XXXX is the frequency in Hz) |
| GAIN:XXXX | Sets the gain. Valid values are 0.25, 0.5, 1, 2, 4, 8, 16, 32 |
| CALIBV:XXXX | Sets a set of error factors in the calibration table for a particular voltage and gain. For description of the payload (XXXX), see below. Stores this in EEPROM. |
| CALIBT:XXXX | Sets a set of error factors in the calibration table for a particular gain. For description of the payload (XXXX), see below. Stores this in EEPROM. |
| CALIB\_ERASE | Erases all calibration data |
| CALIB\_READ | Outputs all calibration data. The format will read the calibration stored in flash, and output in JSON format. See above information on the calibration response. |

**CALIBV payload format**

A comma-separated list of values, where the first value is the gain, and the 10 subsequent values are 5 sets of input raw values, and their corresponding errors. For example, the following would be for a gain of 0.5:

0.5,-123456789,4466,-67891234,-33888,-1387,9221,65432109,88433,912345678,-5

**CALIBT payload format**

A comma-separated list of two values. The first value is the slope in voltage/degree C. The second value is the bias at 25 degrees C. For example, with a payload of “0.001234,0.0323”, the voltage correction based on the temperature would be v = 0.001234 \* (C – 25) + 0.0323.