PYRAMID HC80 Beampath Helium Flow Controller User Manual

Contents

PYRAMID

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Product Information

Specifications

- **Model:** HC80
- **Document ID:** 2765226245
- **Version:** v1

Product Usage Instructions

HC80 Programming
The HC80 programming concepts and methods are explained in this manual, focusing on device-specific IO and functionality unique to the HC80.

Remote Sensor IO
The remote sensor IO are associated with the HC80's remote chamber sensor module. These IO provide information on chamber oxygen concentration, pressure, and temperature.

- Path: /hc80/remote_sensor/luminox/oxygen_percent
- Description: READONLY NUMBER – Chamber oxygen concentration as a percentage
- Path: /hc80/remote_sensor/pressure
- Description: READONLY NUMBER – Chamber pressure in PSI
- Path: /hc80/remote_sensor/temperature

Mass Flow Controller IO
The mass flow controller IO relate to the two mass flow controllers inside the HC80, used for purging and maintaining the chamber at different flow rates.

- Path: /hc80/mfc_large/flow_rate
- Description: READONLY NUMBER – Large flow controller flow rate in SCCM
- Path: /hc80/mfc_small/flow_rate
- Description: READONLY NUMBER – Small flow controller flow rate in SCCM

Relay IO

The relay IO provides information on the state of the HC80 relay, indicating whether it is opened, closed, or locked due to an interlock.

- Path: /hc80/relay/state
- Description: READONLY STRING – The state of the HC80 relay

FAQ

- **Q: What should I do if the remote sensor cable is disconnected?**
  A: If the remote sensor cable is disconnected, the IO associated with the remote sensor will no longer accurately reflect the chamber state. It is recommended to reconnect the cable securely to ensure proper functionality.
- **Q: How does the HC80 compensate for error sources in reported flow rates?**
  A: The HC80's software automatically compensates for error sources in reported flow rates, including latency and potential offsets from zero. This compensation is done internally by the HC80's software.
- **Q: What are the possible states of the HC80 relay?**
  A: The HC80 relay can be in one of three states: opened, closed, or locked. A locked relay is open but cannot be closed due to an interlock mechanism.

Introduction

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Author	@ Matthew Nichols
Owner	Project Lead
Purpose	Explain the programming concepts necessary to use the API and extend the product through external applications.
Scope	HC80 related programming concepts.
Intended Audience	Software developers interested in using the product.
Process	Standard Manual Creation Process
Training	**NOT APPLICABLE**

References

Document	Document ID	Author	Version
IGX – Programmer Manual	2439249921	@ Matthew Nichols	2

HC80 Programming

The concepts and methods described in this manual build on the concepts established in the IGX – Programmer Manual. Please see that document for explanation and examples of how basic IGX programming and interfaces work. This manual will only cover the device-specific IO and functionality that is unique to the HC80.

Remote Sensor IO
These IO are associated with the HC80s remove chamber sensor module. This module is separate from the HC80 unit itself and connected by a cable that goes to the helium chamber. If the cable is disconnected, these IO will no longer accurately reflect the chamber state.

IO Path	Description
/hc80/remote_sensor/luminox/oxygen_percent	**READONLY NUMBER** Chamber oxygen concentration as a percentage.
/hc80/remote_sensor/pressure	**READONLY NUMBER** Chamber pressure in PSI. This i s a differential pressure sensor that measures the differen ce between the chamber and atmospheric pressure.
/hc80/remote_sensor/temperature	**READONLY NUMBER** Chamber temperature in °C. This temperature is measured from the exhaust gas outlet and may not exactly reflect the chamber temperature.

Mass Flow Controller IO
These IO relate to the two mass flow controllers inside the HC80. One MFC is used for purging the chamber at a high flow rate, and the other is used to maintain the chamber with a very small flow rate. These flow rates are analog signals and are measured inside the controller. The reported flow rate has a latency and potentially an offset from zero. The HC80s software automatically compensates for these error sources internally.

IO Path	Description
/hc80/mfc_large/flow_rate	**READONLY NUMBER** The large flow controller flow rate in SCCM.
/hc80/mfc_small/flow_rate	**READONLY NUMBER** The small flow controller flow rate in SCCM.

Relay IO

IO Path	Description
/hc80/relay/state	**READONLY STRING** The state of the HC80 relay. Locked relays are open but cannot be closed due to an interlock. States: “opened”, “closed”, or “locked”

Version Control

Version	Description	Saved by	Saved on	Status
v1	Initial Version	Matthew Nichols	Apr 12, 2024 5:47 PM	**APPROVED**

Document Control
Current document version: v.1
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   for most recent document version

   Friday, Apr 12, 2024, 05:48 PM UTC

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Documents / Resources

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References

- User Manual