AMS/ACSM Tips, Tricks & FAQ’s

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Virtual AMS User’s Meeting
Jan 21, 2021
For Knowledge Base access and to submit support inquiries:

https://Support.Aerodyne.com

Email support inquires to:

CACC-Support@aerodyne.com
Welcome to the Aerodyne Research Customer Support Site. You can search or browse our knowledge base to find manuals, software, and troubleshooting information for our instruments. If you need something that you can’t find feel free to Contact Us.
Be prepared with:
Instrument type and serial number
Description of the problem
Any key events which may have lead to the problem
Any troubleshooting already done

Scroll to the bottom of any page
AMS Advancement Timeline

- **First AMS Delivery**
  - **June 2000**

- **Soot Particle Laser (SP-AMS)**
  - **February 2012**

- **ADQ-1600 Data card**
  - **April 2014**

- **Pfeiffer Turbo Pumps, New Control Electronics, and TPS 2.0**
  - **January 2015**

- **ePTof Chopper**
  - **Dec 2015**

- **First AMS Delivered with Windows 10**
  - **May 2017**

- **First AP240 AMS With Windows 10**
  - **July 2020**

- **Improved ePTof Chopper Electronics**
  - **September 2020**
ePToF Troubleshooting

ePToF chopper electronics calibration: https://support.aerodyne.com/knowledgemebase/articles/KA-01289/en-us

ePToF chopper replacement guide: https://support.aerodyne.com/knowledgemebase/articles/KA-01143/en-us
Standard PToF Troubleshooting

Question:
My chopper is on, but the Electronics Box LCD screen says the frequency = 1.5 Hz. What should I do?

Answer:
Confirm from the window that the chopper wheel is actually spinning. If so, perform the 2% chopper frequency calibration:
https://support.aerodyne.com/knowledgebase/articles/KA-01299/en-us
Question:
My signals suddenly dropped to zero, but the TPS voltages all look okay. What should I do?

Answer:
1. Check if the chopper wheel is moving between open and blocked by looking through the window.
2. Confirm servo PWM signals are present, and if so,
3. Replace Chopper Servo

Chopper Servo Replacement Guide:
https://support.aerodyne.com/knowledgebase/articles/KA-01140/en-us
P2 Controller Fan Failures

On AMS systems 10+ years old, we’ve seen this fan fail, leading to the pumps shutting down when the inlet is opened.
Filament or Heater Continuity Check

DB25 Connector for Filament/Ion Optics/Heater Cable

Filament/Ion Optics/Heater cable pin out:
https://support.aerodyne.com/knowledgebase/articles/KA-01147/en-us
Filament Failures

- **New filament**
- **Normal wear and tear Failure**
- **Likely TPS Low Voltage Supply (LVS) failure**

**Continuous wire**

**Small gap in wire**

**Large gap in wire**
Filament Installation

https://support.aerodyne.com/knowledgebase/articles/KA-01137/en-us
Install filaments such that they are as parallel as possible to the ion cage. Be EXTRA careful when installing that nothing is shorting. The ceramic washer is critical, as it isolates the filament from ground.
Critical ceramic washers

Non-SPAMS configuration

SPAMS configuration

Top View
This side down!
Tuning Tip:

- Tune *both* filaments *before* leaving for the field.
  - This can save time and possibly prevent one from having to vent while in the field. Also, sometimes a filament does not tune as well as one would like, so one may get a better tune with the second filament.

AMS ToF voltage tuning instructional videos:
https://support.aerodyne.com/knowledgebase/articles/KA-01306/en-us
Error code on DAQ corresponding to high temperature in the Prisma

-> Check fan filter for dust deposits
-> Check if fan needs replacement
## Agilent Turbo Pump Compatibility

<table>
<thead>
<tr>
<th>Turbo Pump Type</th>
<th>AMS compatible?</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>V70</td>
<td>YES</td>
<td>Discontinued but available via exchange</td>
</tr>
<tr>
<td>V81</td>
<td>YES</td>
<td>Discontinued and unavailable</td>
</tr>
<tr>
<td>84FS</td>
<td>YES</td>
<td>Available</td>
</tr>
<tr>
<td>74FS</td>
<td>YES</td>
<td>Available</td>
</tr>
<tr>
<td>V301</td>
<td>YES</td>
<td>Discontinued, but available via exchange</td>
</tr>
<tr>
<td>304FS</td>
<td>NO</td>
<td>Overheats and shuts down on AMS</td>
</tr>
<tr>
<td>305FS</td>
<td>?</td>
<td>TBD</td>
</tr>
</tbody>
</table>

305FS is still being evaluated. We will release our findings via AMS Users email list soon.
AMS Maintenance

- Always monitor pump performance
- Always monitor MD1 pressure (load/no load)
- Clean vacuum chamber surface
- Check for loose/missing connections/fasteners
- Clean cooling fan filters
- Check for stressed cables
- Dirt inside computer
- “Dirt” on computer HD (clean up and defrag)
- Pfeiffer Pump Maintenance
### Agilent Turbo Pumps

What are the operating currents for all pumps?

<table>
<thead>
<tr>
<th></th>
<th>Gas Load Off (mA)</th>
<th>Gas Load On (mA)</th>
<th>Delta T* (Degrees C) (Closed/Open)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2</td>
<td>~ 450</td>
<td>~ 850</td>
<td>9/13.3</td>
</tr>
<tr>
<td>P3</td>
<td>~ 250</td>
<td>~ 300</td>
<td>9/9.3</td>
</tr>
<tr>
<td>P4</td>
<td>~ 200</td>
<td>~ 250</td>
<td>6/5.9</td>
</tr>
<tr>
<td>P5</td>
<td>&lt; 200</td>
<td>&lt; 200</td>
<td>6.2/6.5</td>
</tr>
<tr>
<td>P6</td>
<td>~ 200</td>
<td>~ 200</td>
<td>9.6/9.6</td>
</tr>
</tbody>
</table>

*Delta T = Pump Temp – Ambient Temp

These are guidelines. Each AMS may be slightly different. Each user should know the pump characteristics for their specific AMS.
## Pfeiffer Turbo Pumps

What are the operating currents for all pumps?

<table>
<thead>
<tr>
<th></th>
<th>Gas Load Off (W)</th>
<th>Gas Load On (W)</th>
<th>Delta T* (Degrees C) (Closed/Open)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>~ 25</td>
<td>~ 70</td>
<td>9/13.3</td>
</tr>
<tr>
<td>P2</td>
<td>~ 3</td>
<td>~ 3</td>
<td>9/9.3</td>
</tr>
<tr>
<td>P3</td>
<td>~ 2</td>
<td>~ 2</td>
<td>6/5.9</td>
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<tr>
<td>P4</td>
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AMS Pressure Measurements

What is the backing pump pressure?
What is the lens pressure?
Corrosion
Corrosion

Rust

Salt corrosion
Inspect Shipping Container

Fork Lift Damage

Don’t leave instrument in the shipping container
Maintenance Issues, cont’d

Missing fasters
Maintenance Issues, cont’d

Aluminum dust

Missing fastener, chaffing metal
Maintenance Issues, cont’d

Dirty fan filter

Stressed cables
Pfeiffer HiPace Turbo Maintenance

Pfeiffer Turbo Pumps should have the lubricant reservoir replaced every 4 years.

How to exchange lubricant reservoirs on HiPace80 and HiPace300 turbo pumps: https://support.aerodyne.com/knowledge base/articles/KA-01144/en-us
“Crashed” Pfeiffer Split Flow Pump

Attn ToF-ACSM
Users and people who also have CIMS!

Pfeiffer Split Flow pumps need to be sent back to Pfeiffer for full maintenance every 5 years!!
“Crashed” Agilent Turbos

Exchange pumps are less expensive than new, but require sending back the failed pump

Sending back a “crashed” pump, Agilent will impose their “Crash Fee”

Inspect vacuum chamber for bits of metal!!

Crashed Agilent V301 Turbo Pump
Thank you!

Any Questions?