

KEIT

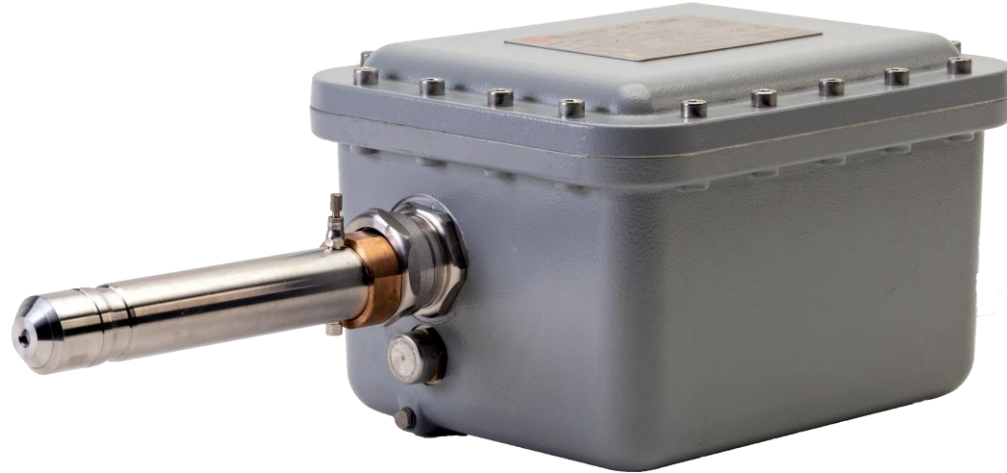
**INDUSTRIAL
ANALYTICS**

Measure | Trust | Improve

Getting the most out of your IRmadillo

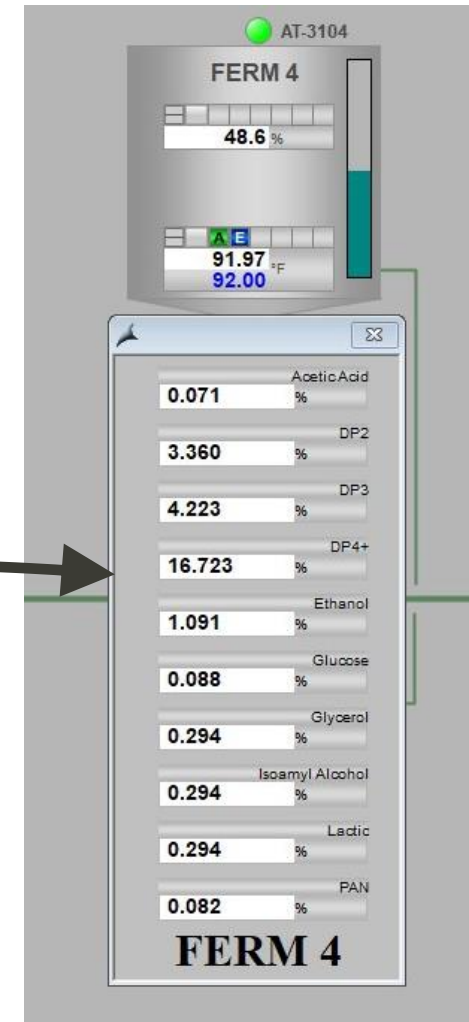
DOC1128

How do I use my IRmadillo in fuel ethanol production?



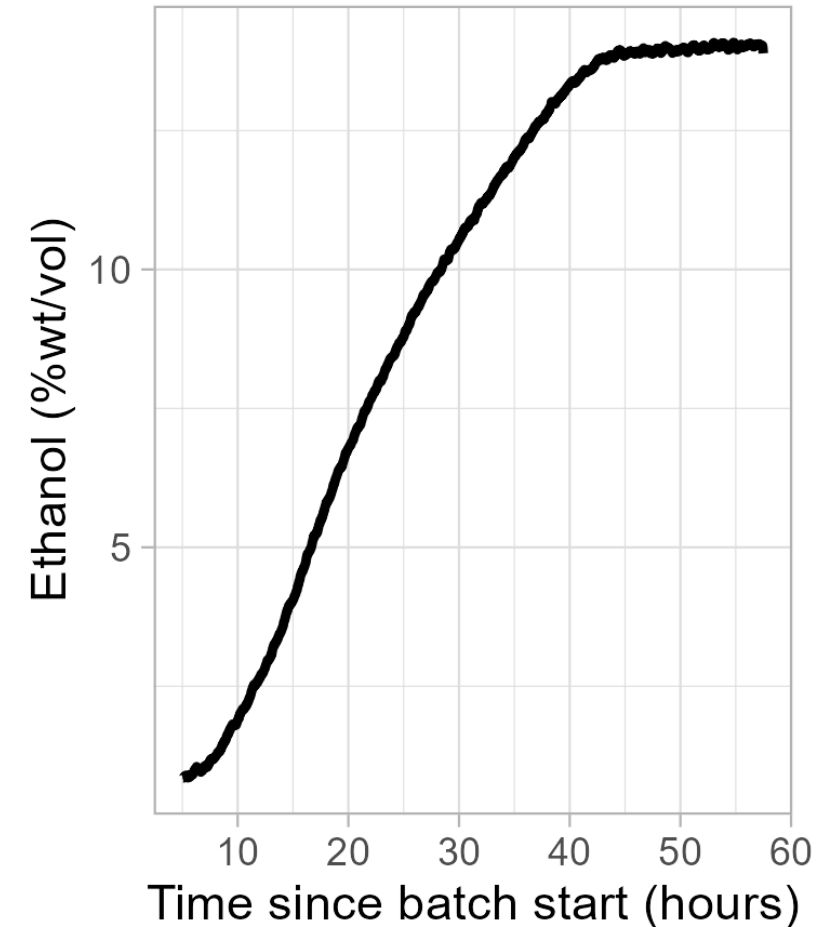
Understanding IRmadillo output

- The IRmadillo is an online, real time chemical concentration analyzer.
- It will output a measurement of every one of the chemicals that are important to you, every two minutes, all the time.

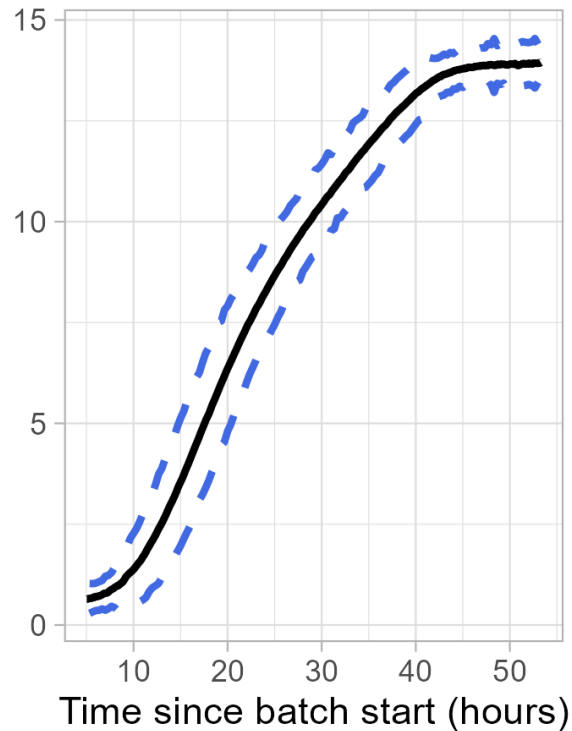
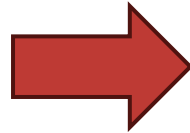
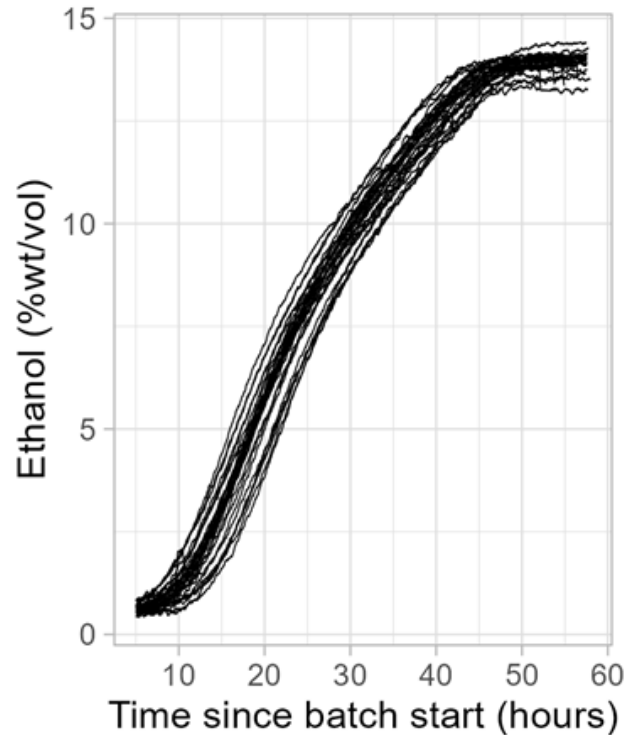


Understanding IRmadillo output

- You can use the IRmadillo's measurements to plot the chemical concentrations over time throughout your fermentation.
- The IRmadillo can be calibrated for as many species as you want – ethanol, sugars, acids, nitrogen, fusels...



What does a good batch look like?



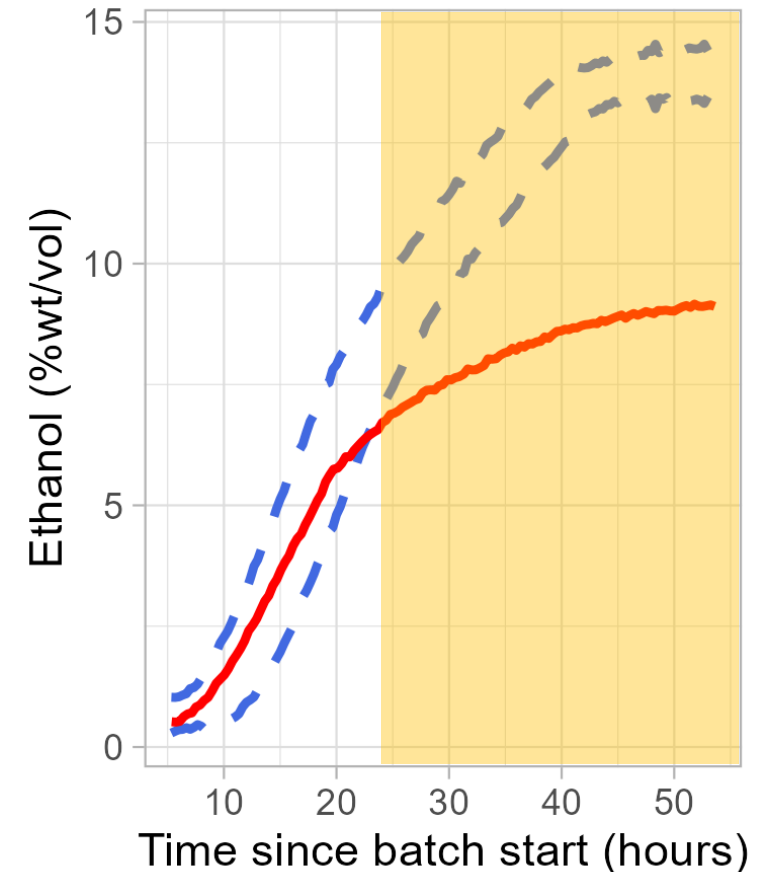
Once you've measured a few batches on your IRmadillo, Keit can provide a "golden batch" profile for your DCS based on your highest-yielding batches.

Then you can raise alarms if you go outside the control limits.

Act fast to save a batch!

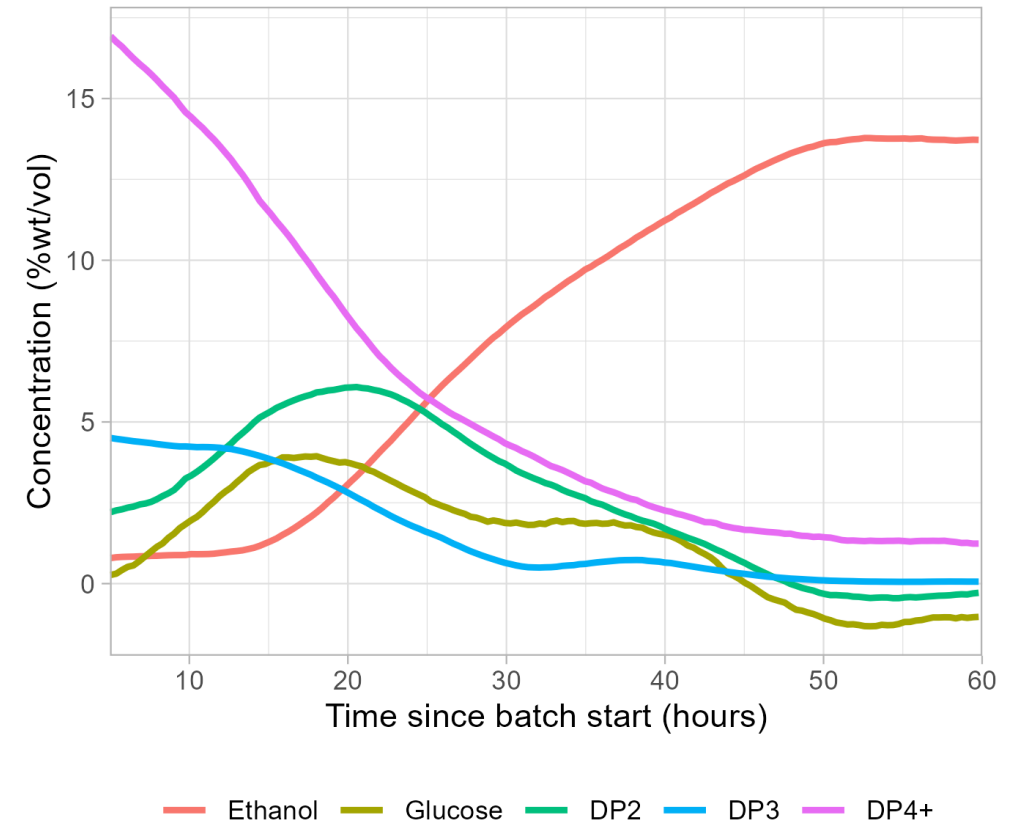
Save or prevent low-yielding batches

- Raise an alarm as soon as your concentrations move off track.
- Look at concentrations of all the species to diagnose problems:
 - Are your lactic and acetic acids getting high? The earlier you see a bacterial contamination, the more likely you are to be able to kill it with antibiotics.
 - Is your ethanol concentration not getting off the ground? Add urea to wake up your yeast and kick-start the fermentation.
 - Is your glucose concentration getting too high? Adjust your enzyme dosing for the next batch to stop your yeast getting stressed.



Optimize your ethanol yield

- The IRmadillo will show you how your ethanol and sugar concentrations change throughout the batch.
- You can see the effects of changes that you make to feed rates, enzyme dosing schedules, and even yeast formulations.
- After a batch has finished, you can adjust future batches based on how your yeast has reacted to the changes that you made.



Winning with the IRmadillo

You get a notification on your phone: your lactic is high.



Monitor live by DCS. Check the trend against your golden batch.



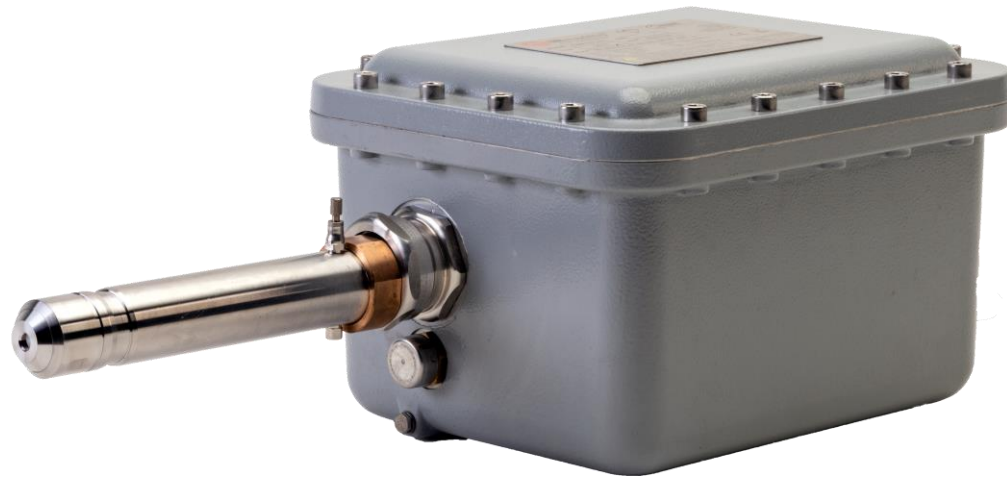
Lactic is high and trending up: time to intervene!



Kill the infection.



What do I need to do next?



Keep recording data

Carry on pulling occasional HPLC samples.

Use these to check your IRmadillo from time to time and make sure the results haven't drifted.

Timestamps still matter! If you record good data now, we can use it to improve the IRmadillo output.

Batch number	Sample	Sampling time
12345	6 h	2025-02-01 09:22
12345	10 h	2025-02-01 13:44
12345	18 h	2025-02-01 19:58

These aren't at exactly 6 h, 10 h or 18 h – **and that's okay!** We just need to know when.

What if IRmadillo doesn't match HPLC?

The ethanol by HPLC is
10.5 %wt/vol.

IRmadillo says 10.4, then
10.2, then 10.3, 10.6...

Is it broken?

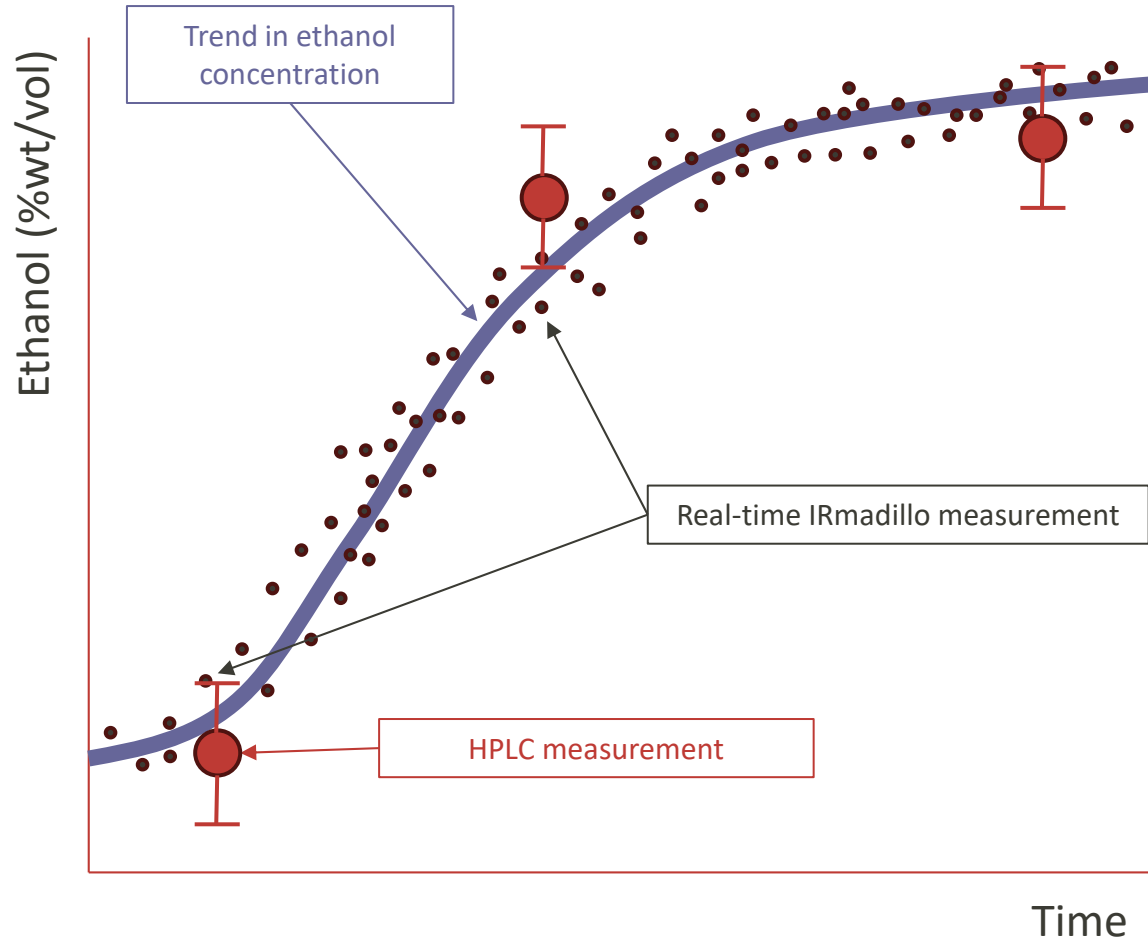
Your IRmadillo is working fine!

An IRmadillo measures every 2 minutes. This means you see measurement noise, which is completely normal.

You would get the same noise in HPLC readings if you pulled a sample every 2 minutes.

To compare with HPLC, look at the trend over time, not single measurements.

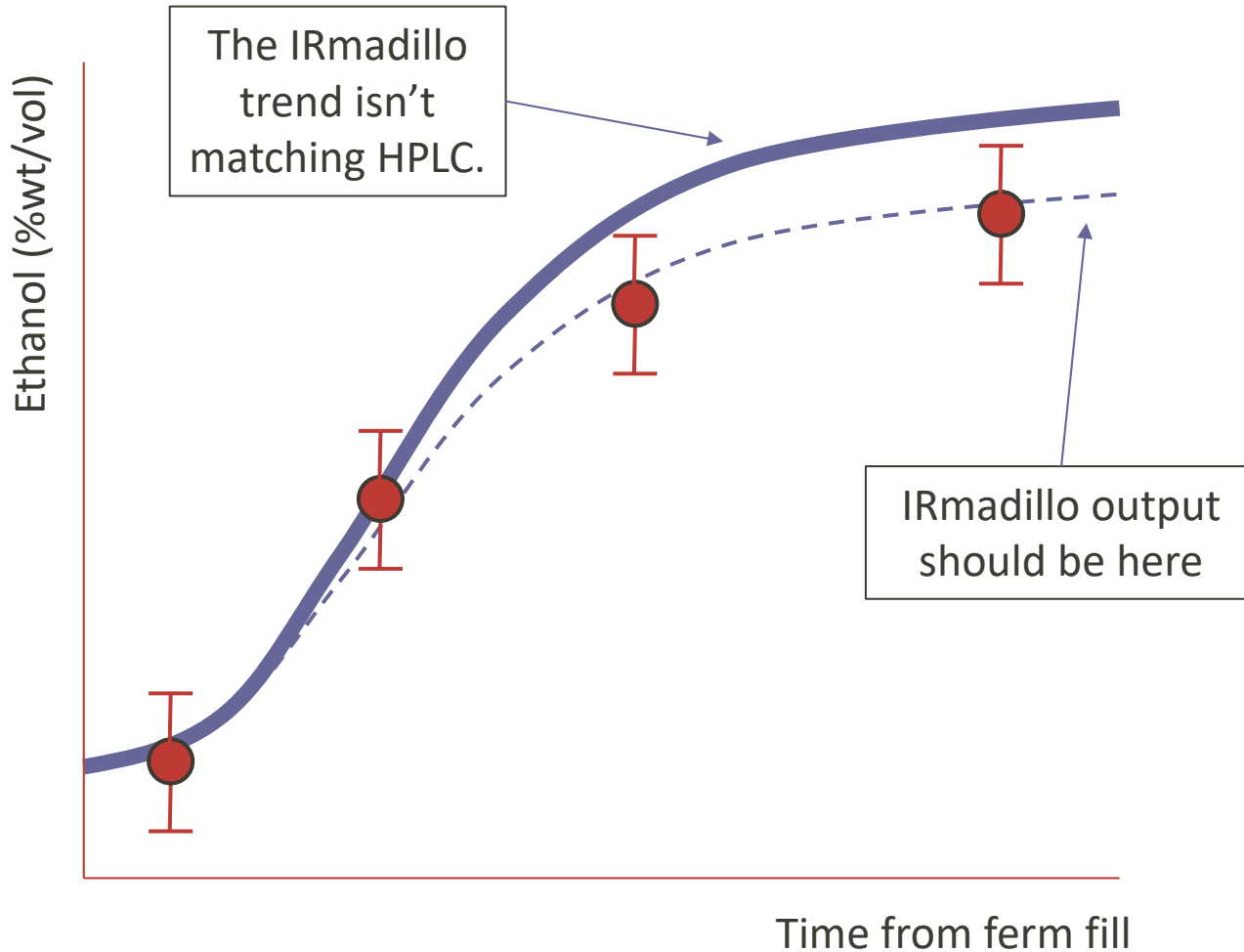
Look at trends, not single values



If you read a single value from the IRmadillo, the noise from its results (plus the invisible noise in your HPLC measurements) will mean the IRmadillo results might not match your HPLC samples exactly.

Instead, look at trends over the whole batch. This lets you see how your fermentation is performing in real time.

Are your models good enough?



If the entire IRmadillo trend is off, the models may need updating.

This may be because your process has changed: have you switched to a new way of doing things?

Or we may simply need to see more of your chemistry to get the model accuracy where you need it to be.

Get us to rebuild your models

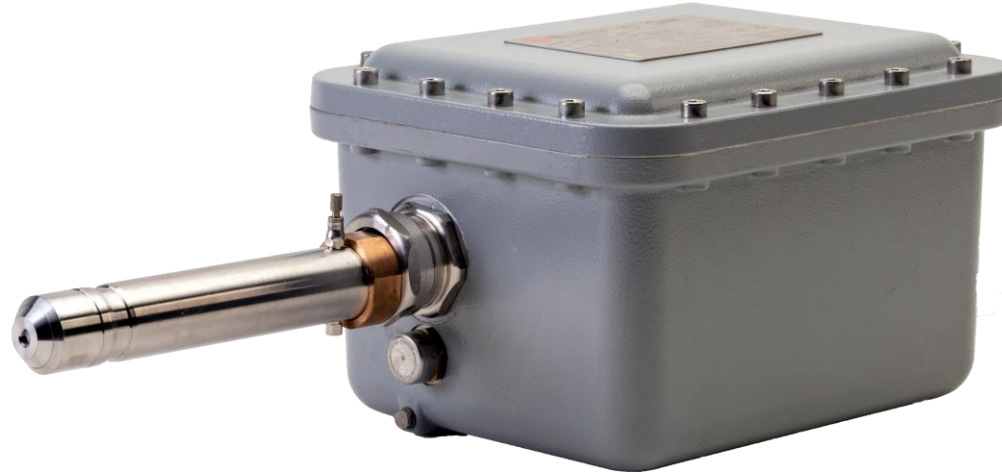
First, let us know there's a problem. Email support@keit.co.uk.

We will arrange a call to investigate. Send us your KeitProject file so we can see what you saw.

We might ask you to collect more samples, perhaps at unusual times in the fermentation cycle, to get the data we need.

Send us that data and we will update your models, usually within 2 weeks of receiving data.

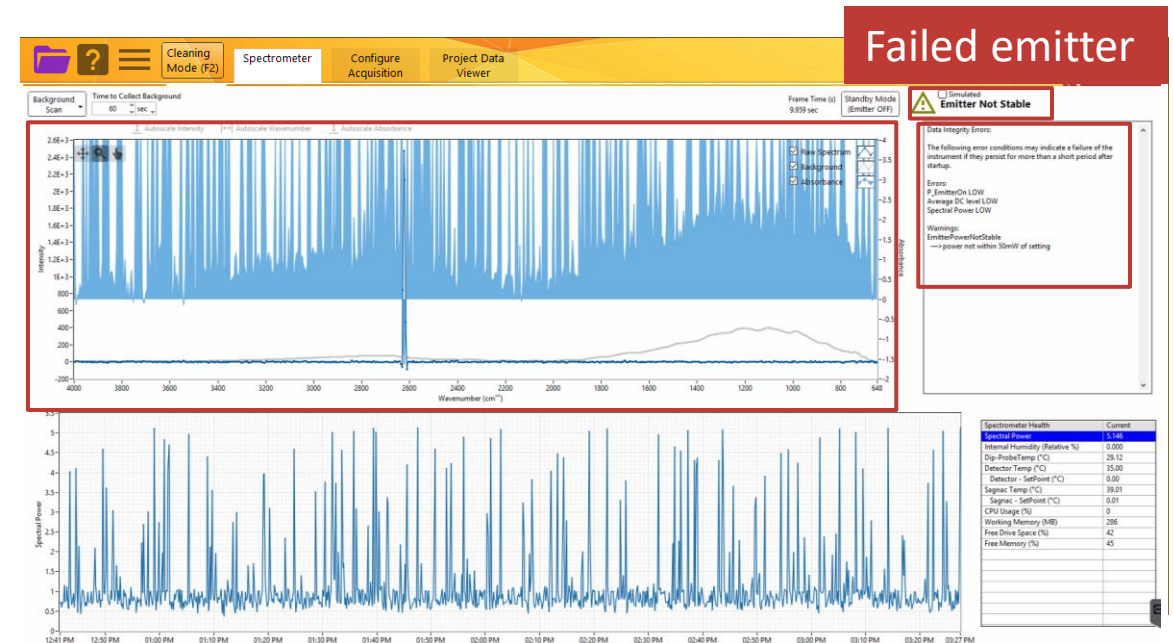
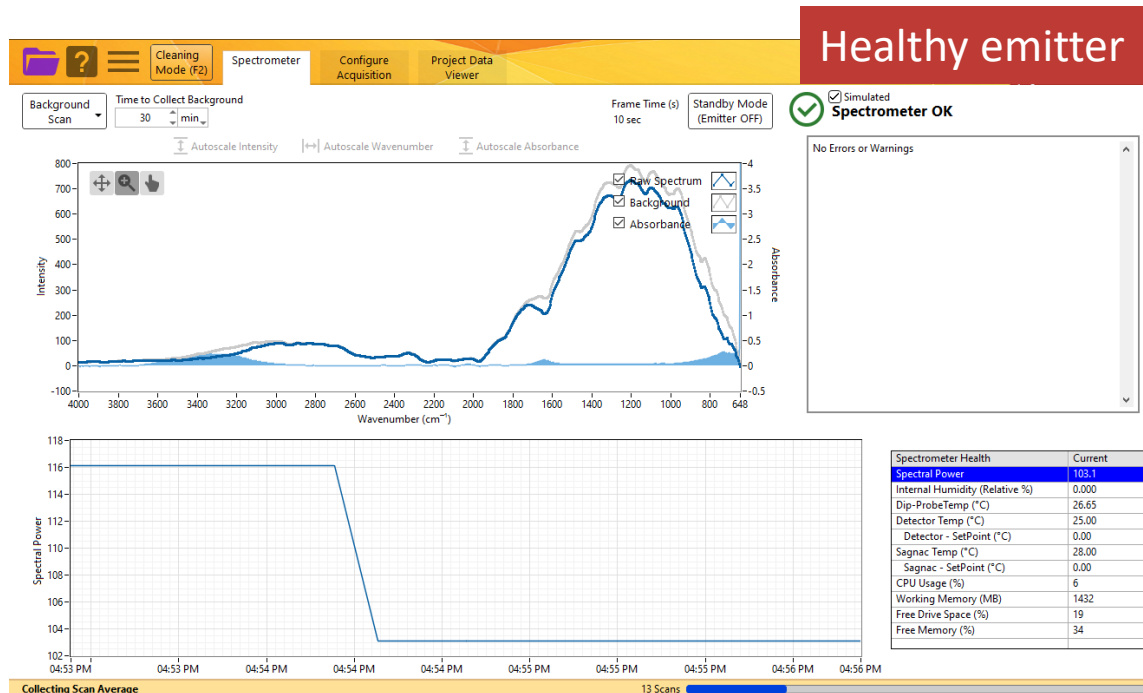
Maintenance and troubleshooting



Maintaining your IRmadillo

- **Air dryer / filtration system:** set up a maintenance schedule (desiccant replacement etc.).
- **O-rings** (if applicable): inspect for ageing or wear on installation or re-installation. Replace annually.
- **HPLC:** regular checks against standards.
- **Emitter:** contact Keit to arrange replacement in the event of an emitter failure.

Emitter replacement

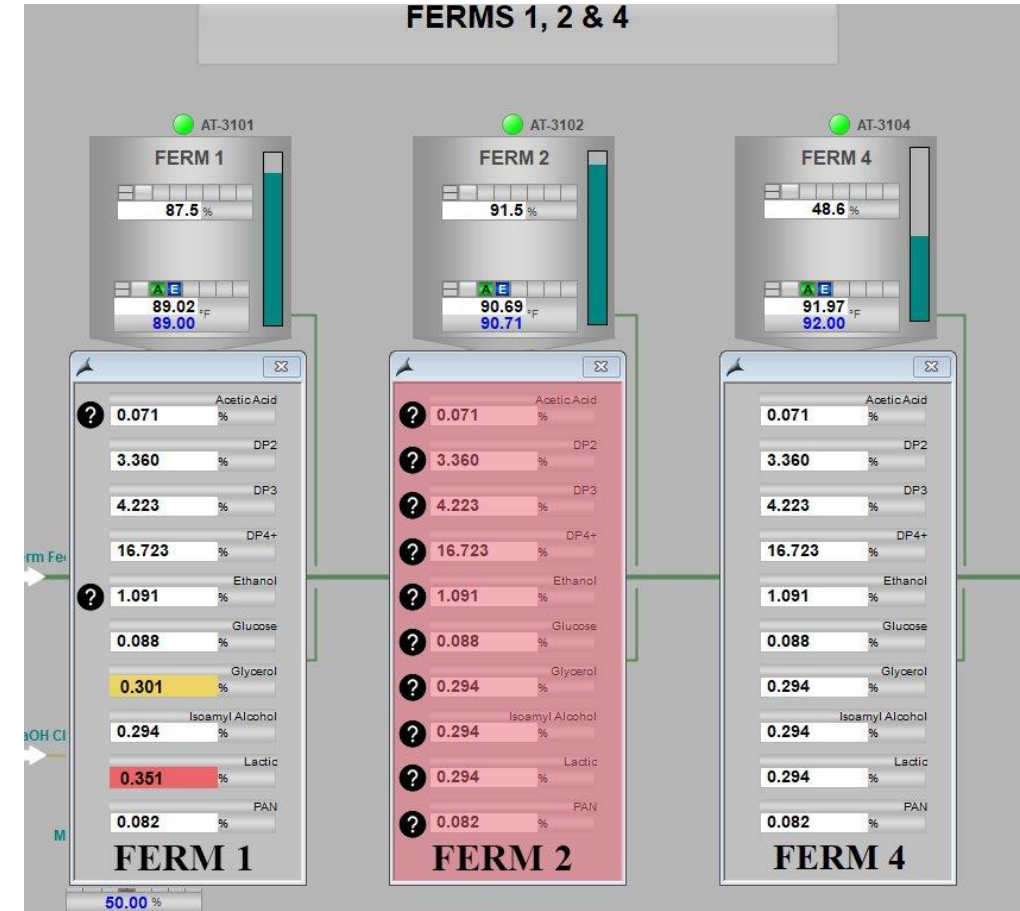


The most common cause of early emitter failure is poor purge air supply.

If your emitter fails, **tell Keit straight away**. We will arrange for a site visit to replace the emitter, or else arrange for investigation at Keit HQ.

DCS warnings

- You can read the IRmadillo's errors and warnings over your DCS
- If your IRmadillo has a heartbeat alarm set up, you'll be told straight away if the IRmadillo stops returning data
- If you can see a readout of the humidity inside your IRmadillo, you'll know if your purge air has failed or isn't dry
 - This will affect the IRmadillo's measurements, so you'll need to resolve it before you act on unusual concentration measurements!
- If there are any other errors or warnings, contact Keit for advice



Reach out to us!

I'm seeing an error message.

How do I use this data?

The measurements seem a little off.

I need a spare part.

We're here to help!
support@keit.co.uk

How can IRmadillo help me save batches?

I have an idea for a new feature.

I want to change my yeast.

Training

New to the IRmadillo? Keit can provide training for operators!

- Let's do this in person: arrange a **site visit**.
- **Remote training** via Teams.
- Can't find a slot for a meeting? We can send you **pre-recorded training videos**.
- Quick questions: support@keit.co.uk

We can set up regular cadence calls to check in with operators and managers. Pick a schedule that works for you.

Useful documents

DOC0837 User manual for Compressed Air Dryer and Filtration Unit

DOC0893 KeitSpec software user manual

DOC0926 Offline sampling for IRmadillo calibration

DOC0930 Calibrating the IRmadillo

DOC0935 IRmadillo user manual

DOC1117 IRmadillo overview for operators

DOC1118 R&R study guidelines ethanol industry

DOC1124 How to see the value with IRmadillo

Available on request or
from our website:

[https://www.keit.co.uk/
user-guides-and-
manuals/](https://www.keit.co.uk/user-guides-and-manuals/)