Heating Season Tips: Controls & Mechanical

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Hours: 9:00 am – 5:00 pm
In this slide deck we will discuss tips on how to address various controls/mechanical applications that can be optimized with equipment from the CUNY Field Equipment Lending Library (FELL).

**Tips on:**

- How to confirm your boiler is staging properly, not short-cycling, and to confirm your equipment is true to its programmed schedule.

- Creating a checklist – it may be the best way to understand your boiler’s performance.

- Using the proper equipment to assess whether your boiler needs a tune-up.

- Performing a visual inspection with a thermal image camera on your equipment to assess if equipment is overheating and therefore failing.

*Remember: click on the equipment images to be taken to their listing in the online FELL directory.*
### Controls & Mechanical

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## Controls & Mechanical

### Applications

- Boiler sequencing and short cycling
- Start/stop scheduling (boiler, pump, fan, air compressor)

### Instruments to use

- Motor on/off data logger

### Tips

1. If using non-modulating boilers it may be better to stage subsequent boilers **ON** once the primary boiler has reached full capacity, rather than cycling multiple boilers on and off to meet the load.

2. **Cycling** a boiler on and off is very inefficient because there is a pre-ignition purge and a post-ignition purge that draws heat out of the boiler with each cycle, we want to always **avoid frequent cycling**.

3. The **motor on/off data logger** records motor on and off conditions within an AC magnetic field with its internal sensor, providing you the run-time of how long the motor has been on.

4. Use a motor on/off logger to confirm your boiler is **staging properly**, not short cycling, and to confirm your equipment is being true to its programmed schedule.

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**Avoid frequent cycling!**

![Motor on/off logger on boiler motor](image)

![Magnets](image)
Motor on/off logger showing bad cycling

Boiler short cycles every 6-10 min
Motor on/off logger showing good cycling

![Graph showing motor on/off status with good cycling]

- Status (0=OFF, 1=ON)
- Date Range: April 25, 2007 to May 03, 2007
- On: Wednesday, April 25, 2007 to Thursday, April 26, 2007
- Off: Friday, April 27, 2007 to Sunday, April 29, 2007
- On: Monday, April 30, 2007 to Tuesday, May 01, 2007
- Off: Wednesday, May 02, 2007 to Thursday, May 03, 2007

Good
### Controls & Mechanical

#### Applications

- Boiler tune-up (burner combustion/stack temperature/flue gas test (CO, O2, CO2, NO, NO2, SO2)

#### Instruments to use

- **Combustion analyzer**

#### Tips

Creating a checklist will help you understand if your boiler needs a tune-up or if it’s not functioning properly. Sample checklist:

- Check flue gases and combustion
- Check all relief valves for leaks
- Check water level
- Check pilot and burner assemblies for buildup
- Check boilers operating characteristics
- Check stack temperature
- Perform a combustion and emission test on your boiler with a combustion analyzer
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Stack temperature/flue gas sampling locations

Figure 9. Flue Gas Sampling Locations

Figure 10. Stack Temperature and Combustion Air Temperature Sampling Locations
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### Tips

Using a thermal image camera gives you a visual that you can’t see with the naked eye and provides you with the information you need to prevent your mechanical equipment from failing due to overheating. Specifically, a visual inspection allows you to:

- Identify motors overheating.
- Identify why electric breakers are tripping due to overheating.
- See which equipment is overloaded.

*Overheating motor*

*Overheating electric breaker*