

Trace elemental analysis

Thermo Scientific iSC-65 Autosampler

Power your productivity with the iSC-65 Autosampler Step Ahead function

The Thermo Scientific™ iSC-65 Autosampler enables automation for laboratories carrying out trace elemental analysis with Thermo Scientific™ iCAP™ PRO Series ICP-OES systems; Thermo Scientific™ iCAP™ Qnova™ Series ICP-MS systems, comprising the iCAP Q ICP-MS, iCAP RQ ICP-MS, iCAP RQplus ICP-MS; and Thermo Scientific™ iCAP™ TQ Series ICP-MS systems, which include the iCAP TQ ICP-MS, iCAP TQe ICP-MS, and iCAP TQs ICP-MS. The iSC-65 Autosampler is ideal for laboratories seeking to increase sample throughput.

When using an autosampler for ICP-OES and ICP-MS analysis, the autosampler typically works in a sequential manner (Figure 1), following the basic steps of:

- Sample uptake – The autosampler probe moves to the sample and the instrument pumps the sample to the instrument until a stable flow is introduced to the plasma.
- Sample analysis – The autosampler probe remains in the sample for the entire period of data acquisition allowing the instrument to pump the sample at a constant rate.
- Sample rinse – Once data acquisition is complete, the autosampler probe moves to the rinse and the sample solution remaining in uptake tubing is flushed to waste.

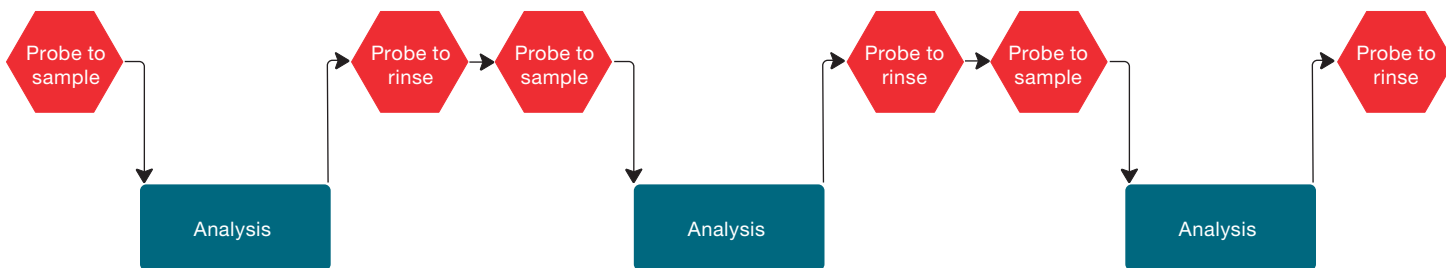


Figure 1. Autosampler probe position using a standard sequential autosampler

This sequential method can be inefficient as there is the potential for some of these steps to be carried out simultaneously. The Step Ahead function of the iSC-65 Autosampler enables analysis and wash steps to be carried out at the same time and reduces the total analysis time per sample. When using this function, the autosampler will move to probe to the rinse station while the instrument uses the sample solution remaining in the uptake tubing to complete the analysis (Figure 2).

The Step Ahead function is simply enabled within the Thermo Scientific™ Qtegra™ Intelligent Scientific Data Solution™ (ISDS) Software by setting a Step Ahead time (Figure 3), which should be no more than the Uptake time. In this example, with an Uptake time of 30 s, a Step Ahead time of 25 s is typical.

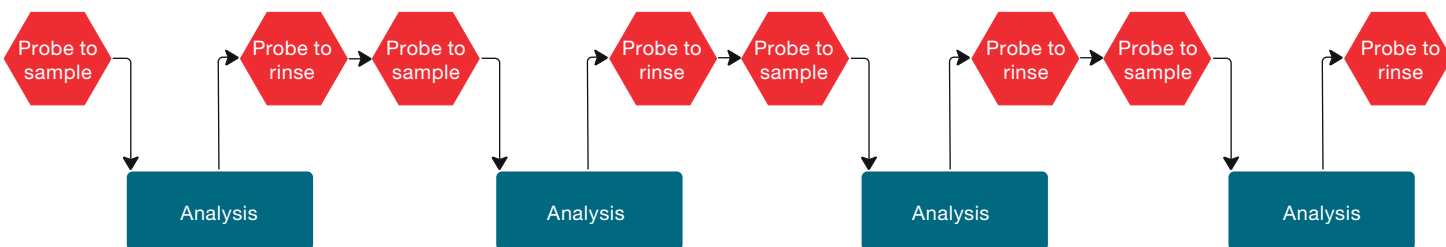


Figure 2. iSC-65 Autosampler probe position with Step Ahead activated

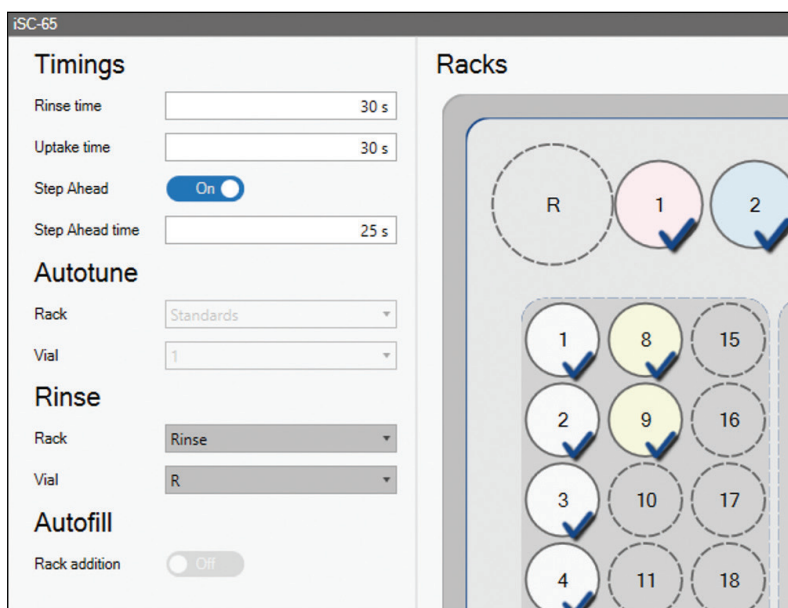


Figure 3. Activating the Step Ahead function and setting a Step Ahead time within the Qtegra ISDS Software

The amount of time that can be saved per sample is determined by the length of the uptake tubing. Figure 4 shows a section from a LabBook acquired without Step Ahead; the total analysis time is 2 minutes, 7 seconds per sample. When the Step Ahead function is activated (Figure 5) and the samples re-analyzed, the sample-to-sample analysis time reduces by the Step Ahead time of 25 seconds to 1 minute, 42 seconds – a savings of 25 seconds per analysis.

Concentrations				
No	Date / Time	Sample Type	Label	
4	12/14/22 12:02:40 PM	STD		
5	12/14/22 12:04:47 PM	UNKNOWN	Tap water 1	
6	12/14/22 12:06:54 PM	UNKNOWN	Tap water 2	
7	12/14/22 12:09:01 PM	UNKNOWN	Tap water 3	
8	12/14/22 12:11:09 PM	UNKNOWN	Tap water 4	
9	12/14/22 12:13:16 PM	UNKNOWN	Tap water 5	
10	12/14/22 12:15:23 PM	UNKNOWN	Tap water 6	
11	12/14/22 12:17:31 PM	UNKNOWN	Tap water 7	
12	12/14/22 12:19:38 PM	UNKNOWN	Tap water 8	
13	12/14/22 12:21:46 PM	UNKNOWN	Tap water 9	
14	12/14/22 12:23:53 PM	UNKNOWN	Tap water 10	
15	12/14/22 12:26:00 PM	QC - CCB	Blank 1	
16	12/14/22 12:28:08 PM	QC - CCV	QC -MET normal	

Figure 4. A section of a completed LabBook without the Step Ahead function activated, showing sample analysis times of 2 minutes, 7 seconds

Concentrations				
No	Date / Time	Sample Type	Label	
4	12/14/22 12:36:22 PM	STD		
5	12/14/22 12:38:04 PM	UNKNOWN	Tap water 1	
6	12/14/22 12:39:46 PM	UNKNOWN	Tap water 2	
7	12/14/22 12:41:28 PM	UNKNOWN	Tap water 3	
8	12/14/22 12:43:11 PM	UNKNOWN	Tap water 4	
9	12/14/22 12:44:53 PM	UNKNOWN	Tap water 5	
10	12/14/22 12:46:35 PM	UNKNOWN	Tap water 6	
11	12/14/22 12:48:18 PM	UNKNOWN	Tap water 7	
12	12/14/22 12:50:00 PM	UNKNOWN	Tap water 8	
13	12/14/22 12:51:43 PM	UNKNOWN	Tap water 9	
14	12/14/22 12:53:25 PM	UNKNOWN	Tap water 10	
15	12/14/22 12:55:07 PM	QC - CCB	Blank 1	
16	12/14/22 12:56:49 PM	QC - CCV	QC -MET normal	

Figure 5. A section of a completed LabBook with the Step Ahead function activated, showing sample analysis times of 1 minute, 42 seconds

Based on the example analysis method above, for a LabBook of 240 samples (4 autosampler racks, each with 60 samples), the total analysis time without the Step Ahead function activated would be 8 hours, 28 minutes; whereas with Step Ahead activated, the total analysis time would be 1 hour, 40 minutes shorter – a time savings of 20%. Depending on the length of the uptake tubing, the time savings could be even greater.

The iSC-65 Autosampler with the Step Ahead function enables a series of potential savings for routine laboratories:

- Reduced utility costs (gas, electricity, etc.)
- Reduced sample volume requirements, which lead to lower consumption of the speciality chemicals used in sample preparation; a potential increase the number of samples that can be analyzed in a full rack, reducing operator actions in a high throughput laboratory
- Reduced sample waste and subsequent disposal costs
- Improved sample throughput, directly improving cost of ownership for the entire ICP-OES or ICP-MS based analytical workstation

With these savings, the iSC-65 Autosampler with the Step Ahead function can offer a significantly lower cost of ownership in all laboratories, lowering their overall environmental impact.

Learn more at thermofisher.com/iSC-65