

## TM2 Source Tray Test in ISAC Test Stand April/May 2015

What to test	Observe	Criteria	Results
Vacuum cleanliness	IG1 (before heating)	< 5 E-7 Torr	6.9E-7 Torr 2015-04-30 4.8E-7 Torr 2015-05-04 (w/o left coil line) 2.8E-7 Torr 2015-06-01 (after heating)
Water lines, brazing, soldering, c-seals	IG1	No increase in vacuum when water is switched on	Pass
	RGA (if operational)	No increase in mass 18 when water is switched on	Pass
	Flow meters	HS + MSP > 4 lpm TGHT > 5.5 lpm TBHT > 5.5 lpm COIL > 5 lpm	4.5 lpm 5.9 lpm 6.2 lpm 5.2 lpm
High voltage BIAS	BIAS I @ 55 kV	< 60 $\mu$ A	43 uA @ 55 kV
	# sparks @ 55 kV	< 1/ 10 min	No sparks for 30 min – first test < 4 sparks hour – final test
High voltage EINZEL	EZL I @ 30 kV	< 125 $\mu$ A	110 uA @ 30 kV
	# sparks @ 30 kV	< 1/60 min	No sparks for 60 min
Voltage Extraction Electrode	EE I @ 2 kV	< 700 $\mu$ A	691 uA @ 2kV (cold)
Voltage Anode/Cathode	ANODE I @ 300 V (cold source)	= 0 A	0.000 mA @ 300 V
High current	TGHT U @ 580 A	<7.2 V	7.1 V 7.5 V
	TBHT U @ 320 A	< 2.4 V	2.5 V at 300 A 2.6 V at 300 A
	COIL U @ 50 A	< 0.5 V	0.34 V
Beam transport	Steerers	Confirm steering horizontal Confirm steering vertical	Steering confirmed
	Einzel lens	Confirm focusing	Focusing confirmed
Ion Source (FEBIAD)	Extracted beam	Confirm Ne beam on FC6 > 1E-9 A	1.4E-9 A at 580 A, 300 A, 200 V, 50 A
Mass spectrum	Record mass spectrum from source	Compare with previous data	OK
Emittance	Emittance	Compare with previous data	OK

## e-log entries

Final test:

<https://elog.triumf.ca/TIS/Test-Stand/447>

Test aborted due to EE line touching coil line – electrical short:

<https://elog.triumf.ca/TIS/Test-Stand/444>

Test with redesigned coil conductor blocks – repeated leak at coil conductor block:

<https://elog.triumf.ca/TIS/Test-Stand/441>

Leak developed at coil conductor block while target hot

First test:

<https://elog.triumf.ca/TIS/Test-Stand/438>

Leak developed at coil conductor block while target hot

## Notes

1. EZL was tuned to 15.7 kV at 30 kV BIAS. Required EZL voltage at 60 kV BIAS is expected to be 31.4 kV (5% more than the rated voltage for the cable used)
2. VCB1 steering required was 700 V (500 V CBC). A steering voltage of 1400 V could be required at 60 kV
3. TBHT and TGHT voltage was somewhat higher than expected. This could be explained by the thermal cycling of the target and the trips due to vacuum leaks.
4. Window cooling lines were installed but not connected to the water block nor the windows
5. The read back from the FEBIAD coil power supply stopped working during the test.

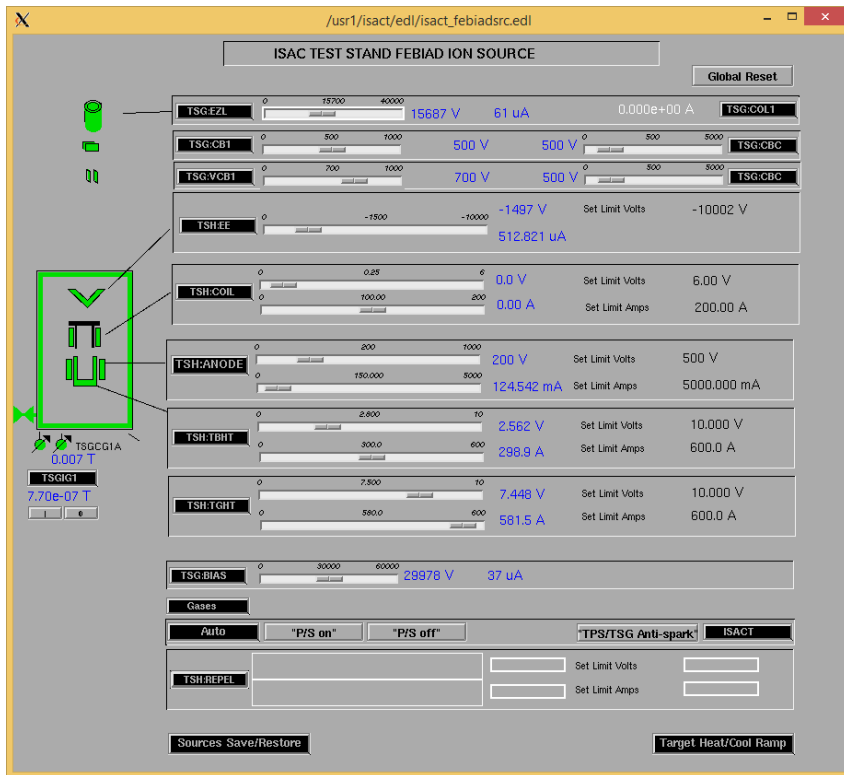


Figure 1: EZL voltage higher than for the Test Stand Source Tray, steering applied.

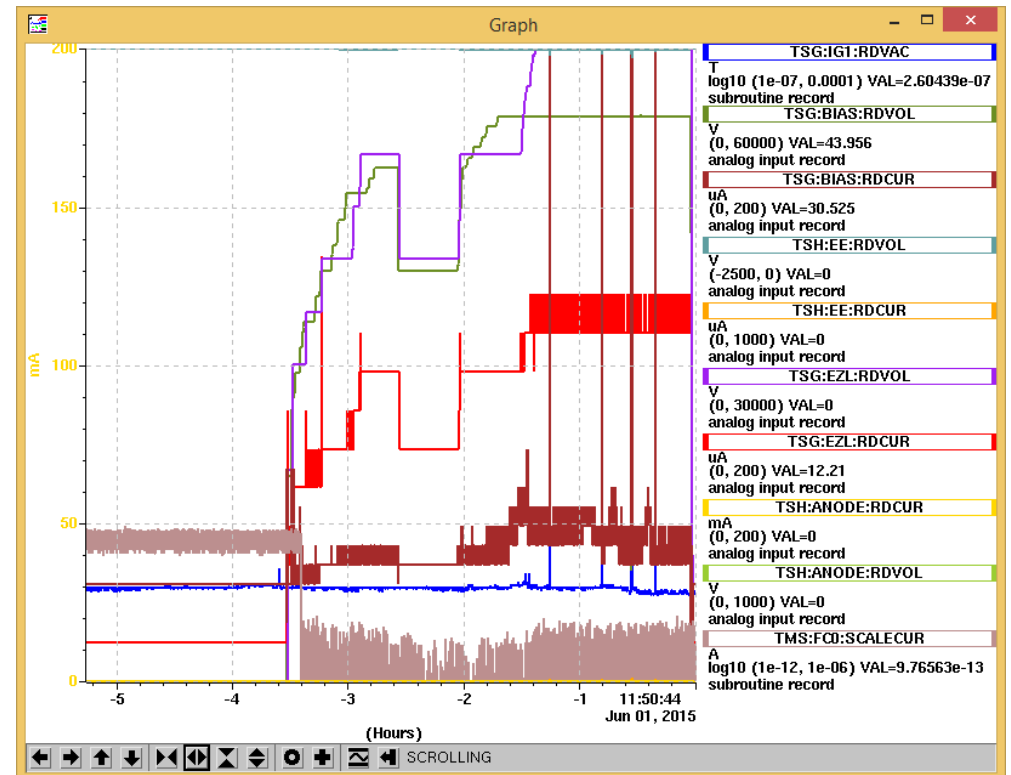


Figure 2: Final HV conditioning

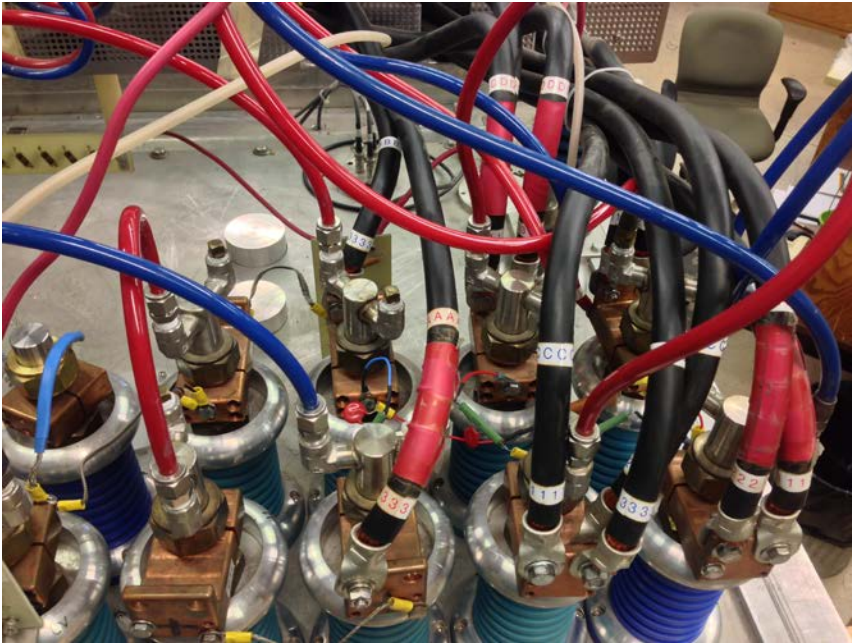


Figure 3: Test Stand coil configuration

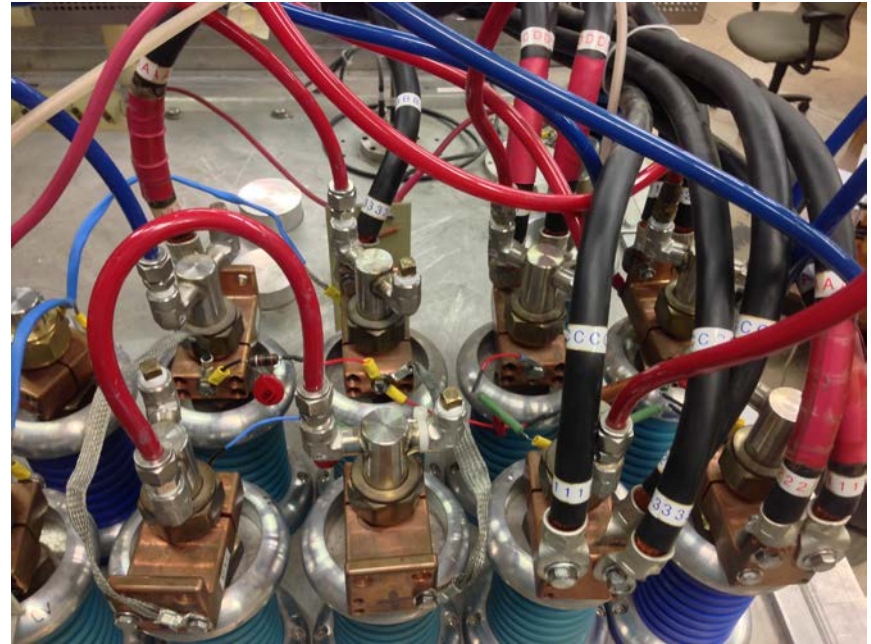


Figure 4: TM2 coil configuration

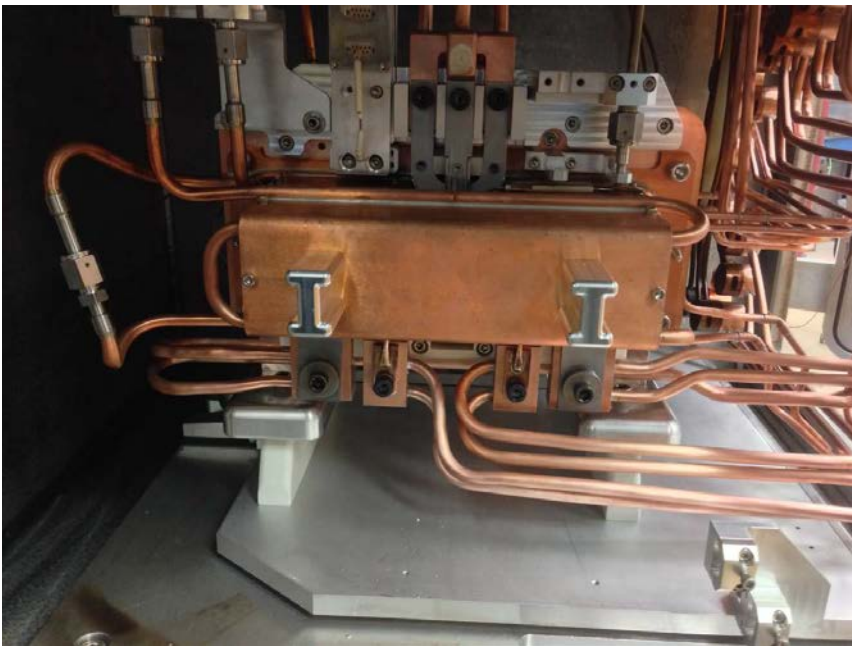


Figure 5: Original coil connector blocks

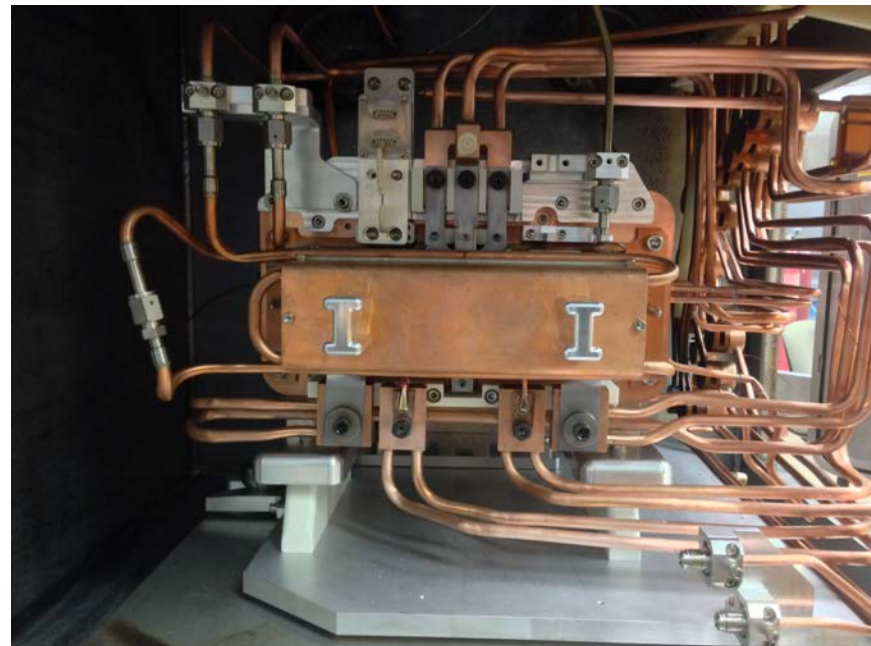


Figure 6: New coil connector blocks