

## 6 Module Connection Checklist

SEQ	ITEM	NOTE	CHECK
Safety	Acknowledge and Activate Work Permit	Call ISAC operators (x7500) Call Main Control Room if disconnecting or closing water supply/return in SEQ 0 (x 7333) or if supplied airhood is necessary	✓
Safety	Hold Pre-Job Briefing	<ul style="list-style-type: none"> <li>✓ • Discuss hazards, safety protocols and work steps listed in this document and checklists.</li> <li>✓ • All workers on the work permit shall be present. If there are concerns about the job, discuss with supervisors and re-plan if necessary.</li> <li>✓ • If you become contaminated during the job, contact the Main Control Room at x7333 for assistance.</li> </ul>	✓
Safety	<ul style="list-style-type: none"> <li>✓ • Electronic Dosimeter</li> <li>✓ • Tank Suit</li> <li>✓ • Respirator/Supplied Air</li> <li>✓ • Overshoes (double)</li> <li>✓ • Gloves(double)</li> <li>✓ • Safety Glasses / Full Face Respirator</li> </ul>	Remove and replace second pair of overshoes when exiting the pit to reduce risk of spreading contamination.	✓
Prep	Check tools: <ul style="list-style-type: none"> <li>✓ • Hex Keys (3/16" &amp; 3/8")</li> <li>✓ • Side Cutter</li> <li>✓ • Wipes</li> <li>✓ • 10" Cable Ties</li> <li>✓ • RAM</li> </ul>		✓
Safety	Check with ISAC Ops re: alpha CAM reading ✓ P beam off for at least 30 min ✓ before entering target pit ✓ Check the General Field of ITW/ ITE ✓	RAM or pole monitor ( $\leq 500 \mu\text{Sv/h}$ )	✓
0	High Active Cooling Water	<ul style="list-style-type: none"> <li>✓ • Verify valve for supply water closed</li> <li>✓ • Verify valve for return water closed</li> </ul>	✓
1	Shutter	<ul style="list-style-type: none"> <li>• Cut cable tie</li> </ul>	✓

Target Module Connection and Disconnection Procedure		
Document-141576	Release No: 4	Release Date.: 2022-05-18


SEQ	ITEM	NOTE	CHECK
		<ul style="list-style-type: none"> <li>• Push down bellow (air cylinder)</li> </ul>	✓
2	Compressed Air to Shutter and Valves (x2)	Shutter should be opened (pushed down)	✓
3	Gas Line <i>copper tube added</i>	<b>FEBIAD target only</b> ✓ <b>Two manual valves are opened</b> ✓	✓
4	ITW/ITE Roughing out	Ask ISAC operator to begin rouging out ITW/ITE	✓
5	High Current Cables: ✓ a) (A)Target Oven + ✓ b) (B)Target Oven - ✓ c) (C)Tube heater - ✓ d) (D)Tube Heater + ✓ e) (T)60KV Bias ✓ f) (PQ)Coil + ✓ g) (RU)Coil -	Connect (f) and (g) if running a FEBIAD. Otherwise: <ul style="list-style-type: none"> <li>• <del>for TM4 - jumper PQRU to 60kV bias copper plate between T and H</del></li> <li>✓ for TM2 - connect RU to 60kV bias plate, leave PQ disconnected from everything</li> <li>• <del>For P2N Target in ITE:</del>              Connect coil+terminal (slave PS+) to R and U on Module              Connect coil-terminal (slave PS -) to P and Q on module</li> </ul>	✓
6	Extraction Electrode (I)	SHV Cable and Connector	✓
7	Two 6-pin connectors (T,H)	plug in cables A and B. Verify that cables do not touch heater terminals or jumpers	✓
8	Einzel Lens (Y)	Einzel lens cable should be routed as far away from all 60 kV corona rings as possible	✓
9	PVC elbow	check that the PVC elbow conduits for the water lines are stable and not drooping. They should not be in contact with any copper conductors in HV shroud.	✓
10	a) Water Lines ✓ 1. Target Oven ✓ 2. Tube Heater ✓ 3. MSP ✓ 4. EE ✓ 5. HS ✓ 6. Window ✓ 7. Coil 1 ✓ b) No drip or leaks on Quick Connector (QC) ✓ c) No contact between SST elbows and QC	a) Water Lines ✓ 1. With bypass loop between Ta+ and Ta- on module ✓ 2. With bypass loop between Tu+ and Tu- on module ✓ 3. Bypassed (looped) on station. Cable tie to station. ✓ 4. Connected to module always ✓ b) Open supply and return valves ✓ 1. Hand check, wipe away water if necessary ✓ 2. <b>SST elbows and quick connectors must be clear of each other, otherwise an electrical short will be produced.</b>	✓

SEQ	ITEM	NOTE	CHECK
11	<p>Vacuum System</p> <ul style="list-style-type: none"> <li>✓ a) TP1 Controller</li> <li>✓ b) TP2 Controller</li> <li>✓ c) TP1 BV1</li> <li>✓ d) TP2 BV2</li> <li>✓ e) IG1</li> <li>✓ f) TP1 TP2 Fans</li> </ul>	<ul style="list-style-type: none"> <li>a) TP1 controller cable to TP1</li> <li>b) TP2 controller cable to TP2</li> <li>c) BV1 connect KF25 with o-ring and 24VDC connector</li> <li>d) BV2 connect KF25 with o-ring and 24VDC connector</li> <li>f) Check on six fans are all in operation</li> </ul>	✓
12	<p>Steerers</p> <p><del>ITE:</del></p> <ul style="list-style-type: none"> <li>• Top</li> <li>• Left</li> <li>• Bottom (right)</li> </ul> <p>ITW:</p> <ul style="list-style-type: none"> <li>• X ✓</li> <li>• Y ✓</li> <li>• Common ✓</li> </ul>	<p>ITE-TM2:</p> <ul style="list-style-type: none"> <li>• Top-X</li> <li>• Left-Y</li> <li>• Bottom (right) – Common</li> </ul> <p><del>ITW - TM2</del> <b>TM2</b></p> <ul style="list-style-type: none"> <li>• X-Top</li> <li>• Y-Left</li> <li>• Common – Bottom (Right)</li> </ul>	✓
13	<del>ISAC Control Page set up (plug, connector) ITW only</del>	<del>Surface with EINZEL LENS, IGLIS, or FEBIAD in ITW</del>	<del>N/A</del>
14	TP1 TP2 Controllers Reset	Electrical room, TP1 and TP2 controllers	✓
15	<p>Water Signals Check</p> <p>a) Target Module:</p> <ol style="list-style-type: none"> <li>1. Target ✓</li> <li>2. Tube ✓</li> <li>3. MSP ✓</li> <li>4. HS ✓</li> <li>5. EE ✓</li> <li>6. Coil (1) ✓</li> <li>7. Module Window ✓</li> </ol> <p>b) Beamline 2A:</p> <ol style="list-style-type: none"> <li>1. Tank ✓</li> <li>2. Dump (Plug) ✓</li> <li>3. Dump Shielding ✓</li> <li>4. 2A Window ✓</li> <li>5. Collimator ✓</li> </ol>	<p>In Electrical room, water signal panels:</p> <p>Yellow lights should flash at certain frequency and green lights should be constantly on</p> <p>*If signal is not right, go back to pit and visually check wheel spin in flow sensor for trouble shooting</p> <p>TM2 and TM4 GE lines are not in use (leak), No signal</p>	✓ OK
16	Double Check Module Connection	General visual check of all connections Verify voltage gaps free of cables and waterlines	✓

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SEQ	ITEM	NOTE	CHECK
17	HV Fence and HV Cover on TM Service Cap	Connect both limit switches and tighten bolts Retract HV Keys	✓
18	Restore HV Keys to Electrical Room	Limit switches signals check in electrical room	✓
19	Start TP1 TP2	ITW/ITE: CG4/CG4S below 200 mTorr (ask ISAC Ops)	✓
20	Check all turbo pump (six) current draw at normal status	Check current draw for each pump on TP controller, current draw at full speed (38kRPM) $\leq 2.0$ A  Visually confirm TPBVs in pit are opened (red buttons stick out)	✓
21	Return Work Permit and E-log entry		✓

NOTES:

DATE: 2023-05-29  
 TARGET: TIC #6  
 TARGET MODULE: TM1 TM2 TM3 TM4  
 STATION: ITW ITE  
 SIGNATURE 1:   
 SIGNATURE 2: 