

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

6 Module Connection Checklist

TM₄ with UC_{x#45}

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"> • Discuss hazards, safety protocols and work steps listed in this document and checklists. • All workers on the work permit shall be present. If there are concerns about the job, discuss with supervisors and re-plan if necessary. • If you become contaminated during the job, contact the Main Control Room at x7333 for assistance. 	✓
Safety	<ul style="list-style-type: none"> • Electronic Dosimeter • Tank Suit • Respirator/Supplied Air • Overshoes (double) • Gloves(double) • Safety Glasses / Full Face Respirator 	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"> • Hex Keys (3/16" & 3/8") • Side Cutter • Wipes • 10" Cable Ties • RAM 		✓
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"> • Verify valve for supply water closed • Verify valve for return water closed 	✓ ✓
1	Shutter	<ul style="list-style-type: none"> • Cut cable tie 	✓

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		<ul style="list-style-type: none"> • Push down bellow (air cylinder) 	✓
2	Compressed Air to Shutter and Valves (x2)	Shutter should be opened (pushed down)	✓
3	Gas Line	FEBIAD target only Two manual valves are opened	N/A
4	ITW/ITE Roughing out	Ask ISAC operator to begin rouging out ITW/ITE	✓
5	<p>High Current Cables:</p> <ul style="list-style-type: none"> a) (A)Target Oven + ✓ b) (B)Target Oven - ✓ c) (C)Tube heater - ✓ d) (D)Tube Heater + ✓ e) (T)60KV Bias ✓ f) (PQ)Coil + N/A g) (RU)Coil - N/A 	<p>Connect (f) and (g) if running a FEBIAD. Otherwise:</p> <ul style="list-style-type: none"> • for TM4 - jumper PQRU to 60kV ✓ bias copper plate between T and H • for TM2 - connect RU to 60kV bias plate, leave PQ disconnected from everything • For P2N Target in ITE: Connect coil+terminal (slave PS+) to R and U on Module Connect coil-terminal (slave PS -) to P and Q on module 	✓
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	<ul style="list-style-type: none"> a) Water Lines <ul style="list-style-type: none"> 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 ✓ 	<ul style="list-style-type: none"> a) Water Lines <ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 1. Hand check, wipe away water if necessary ✓ 2. SST elbows and quick connectors must be clear of each other, otherwise an electrical short will be produced. ✓ 	✓

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SEQ	ITEM	NOTE	CHECK
11	Vacuum System a) TP1 Controller ✓ b) TP2 Controller ✓ c) TP1 BV1 ✓ d) TP2 BV2 ✓ e) IG1 ✓ f) TP1 TP2 Fans ✓	a) TP1 controller cable to TP1 ✓ b) TP2 controller cable to TP2 ✓ c) BV1 connect KF25 with o-ring and 24VDC connector ✓ d) BV2 connect KF25 with o-ring and 24VDC connector ✓ f) Check on six fans are all in operation ✓	✓
12	Steerers ITE: <ul style="list-style-type: none"> • Top • Left • Bottom (right) ITW: <ul style="list-style-type: none"> • X • Y • Common 	ITE-TM2: <ul style="list-style-type: none"> • Top-X • Left-Y • Bottom (right) – Common ITW – TM4: <ul style="list-style-type: none"> • X-Top ✓ • Y-Left ✓ • Common – Bottom (Right) ✓ 	✓
13	ISAC Control Page set up (plug, connector) ITW only	Surface with EINZEL LENS, IGLIS, or FEBIAD in ITW	N/A
14	TP1 TP2 Controllers Reset	Electrical room, TP1 and TP2 controllers	✓
15	Water Signals Check a) Target Module: 1. Target ✓ 2. Tube ✓ 3. MSP ✓ 4. HS ✓ 5. EE ✓ 6. Coil (1) ✓ 7. Module Window ✓ b) Beamline 2A: 1. Tank ✓ 2. Dump (Plug) ✓ 3. Dump Shielding ✓ 4. 2A Window ✓ 5. Collimator ✓	In Electrical room, water signal panels: Yellow lights should flash at certain frequency and green lights should be constantly on ✓ *If signal is not right, go back to pit and visually check wheel spin in flow sensor for trouble shooting TM2 and TM4 GE lines are not in use (leak), No signal	✓
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) ≤ 2.0 A	✓
		Visually confirm TPBVs in pit are opened (red buttons stick out)	✓
21	Return Work Permit and E-log entry		✓

NOTES:

DATE:

TARGET:

UC # 45

TARGET MODULE: TM1 TM2 TM3

TM4

STATION: ITW ITE

SIGNATURE 1:

SIGNATURE 2: