MAINTENANCE TRACKING TOOL

Pre-Maintenance

Usage/Calendar based maintenance (UBM/CBM) NOTE! Refer to the PETtrace Service Manual - Maintenance (direction 2169049-100) for detailed instructions, apply LOTO and use PPE.	
System ID:	NE209962
Maintenance performed in accordance with instructions as outlined in the PETtrace Service Manual - Maintenance (direction 2169049-100) (signature (typed and signed)):	

Location	Action	Labor time (min.)	Sign.	For only optional operations note down if the operation is performed or not
Vacuum	**NOTE! Hydrogen gas flow should be on as for normal production.** • Read and record the vacuum pressure • Perform a BEV leak check : open the BEV for 2 minutes and close it. After 10 minutes open again the BEV,the vacuum value must not reach the value of 1.0*E-5	50		Optional

Vacuum pressure readout — **Gas flow(sccm):** 4.0

Gauge number	Pressure (x10-) without gas	Pressure (x10-) with gas
A1 (4 on TCS 1001):	0,0036	0,035
A2 (13 on TCS 1001):	UR	UR
B1 (14 on TCS 1001):	UR	UR

TPG parameters

	Low limit (x10-)	High limit (x10-)
A1:	0,1	0,7
A2:	0,07	0,2
B1:	0,000018	0,00003

• Press OFF on the VCU, followed by VENT, read and record the current VENT time

Vacuum VENT time

System software

Subsytem	Version
Master:	3,6
ACS:	4.3.2
Service System:	3.6.0
Manager:	TSA
Informix (only applicable to SUN-Master Station):	NA

VENT time:	2022-11-16 11:18

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MAINTENANCE TRACKING TOOL

Vacuum

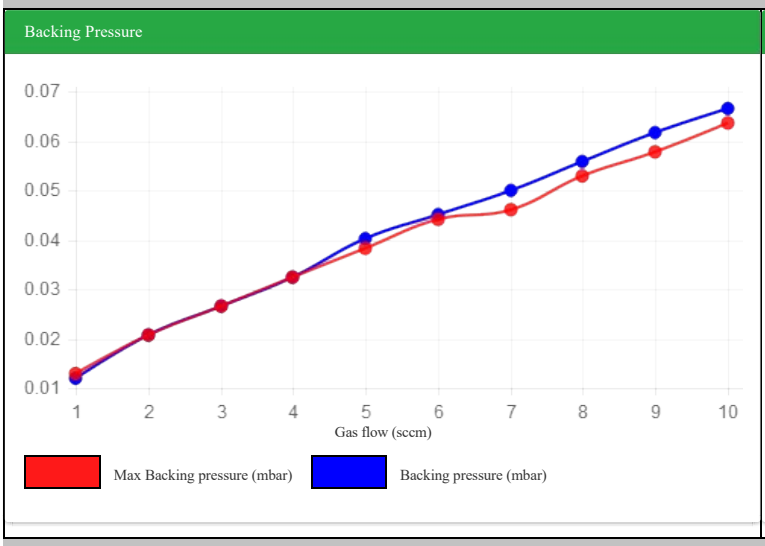
Test of vacuum tightness on PSS

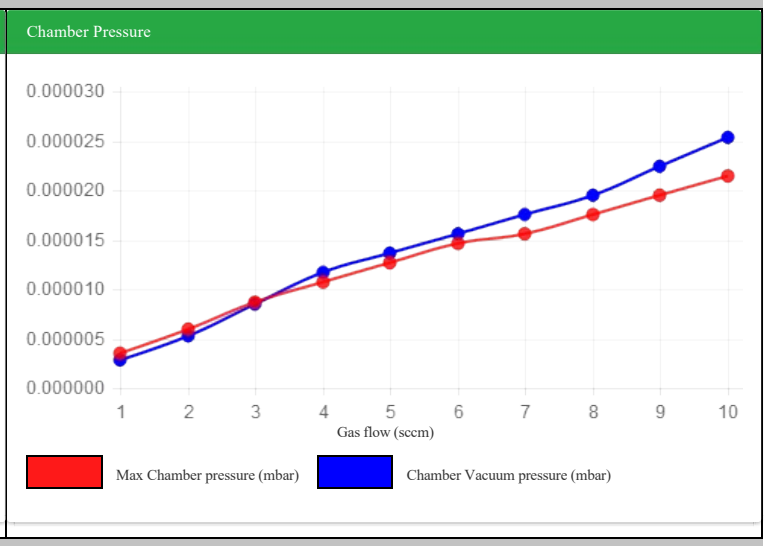
Plot vacuum pressure as function of gas flow from 1sccm to 10 sccm.
Vacuum pressure vs gas pressure should be a linear relationship.

Gas flow setting: 5,0 +/- 1 sccm

Gas flow	Chamber vacuum pressure (mbar)	Backing pressure	Max Chamber pressure (mbar)	Max Backing pressure (mbar)
1	2.9E-6	0.012	3,60E-06	1,30E-02
2	5.4E-6	0.021	6,10E-06	2,10E-02
3	8.7E-6	0.027	8,90E-06	2,70E-02
4	1.2E-5	0.033	1,10E-05	3,30E-02
5	1.4E-5	0.041	1,30E-05	3,90E-02
6	1.6E-5	0.046	1,50E-05	4,50E-02
7	1.8E-5	0.051	1,60E-05	4,70E-02
8	2.0E-5	0.057	1,80E-05	5,40E-02
9	2.3E-5	0.063	2,00E-05	5,90E-02
10	2.6E-5	0.068	2,20E-05	6,50E-02

OK value | Too low value



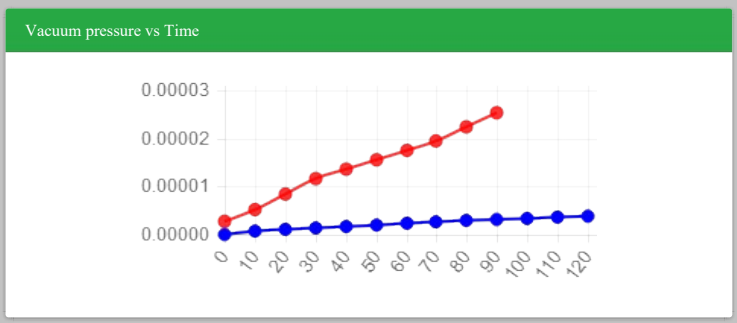


Pass critera: Linear relationship between vacuum pressure and gas flow. (Blue line should be below red line)

Vacuum leak test performed on PSS
With the vacuum system operating in pump mode with all BEV closed and without gas flow.

Set Vacuum system on VCU to Standby and observe the leak rate into the cavity (using pressure as proxy)

Time from Set Standby (sec)	Vacuum pressure (mbar)	Max leak rate
0	3.0E-8	1,80E-07
10	1.9E-7	1,00E-06
20	3.4E-7	1,50E-06
30	5.0E-7	1,90E-06
40	6.5E-7	2,30E-06
50	9.2E-7	2,70E-06
60	1.0E-6	3,00E-06
70	1.2E-6	3,30E-06
80	1.3E-6	3,60E-06
90	1.4E-6	3,90E-06
100	1.5E-6	4,20E-06
110	1.6E-6	4,60E-06
120	1.7E-6	4,90E-06



Pass critera: Time to reach 1.0E-5 mbar > 10 s (Blue line should be below red line)

Vacuum	• Switch on the water cooling to the diffusion pump • Press STANDBY on the VCU, record time

Standby time	
Actual standby start time:	10:27

• Verify that the green DP-lamp on the VCU lights up within 30min, re-adjust DP temp-switch as required

DP-lamp activation time		
DP -lamp activated in (min):	0	**Max 30min**

• Press PUMP on the VCU and note the following values:

Pumping down		
Time before HVV opening	11	**10-15 min**
Actual time for HVV opening:	0	**<30s**
Actual time to reach 1.0*E-5	0	

• After reaching the vacuum value of 1.0*E-5 open the IS gas flow at 10sccm for 15 minutes

Vacuum	**WARNING! Diffusion pump may be very warm, verify that at least 2hrs has passed since pump shutdown.** **WARNING! Rotary and/or diffusion pump oil may be radioactive, verify activity level by performing an activity survey!** **NOTE! Verify that all cables are free from interference with the diffusion pump, interference may cause cable melting and/or electrical shortcut** • Verify the oil level and the color of the rotary pump oil, re-fill or change as required, record re-filled or changed volume

Rotary pump oil level	
Date of the last replacement of oil:	2022-11-07
Volume filled/changed (ml):	0

Maintenance of the diffusion pump: to be performed every 5 years	
Last maintenance of the diffusion pump	

Ventilate the diffusion pump by removing Pirani 1

NOTE! Verify that the water cooling is shut off before disconnection of the diffusion pump

• Remove the diffusion pump and drain the oil

NOTE! Measure the lenght of the Jet assy before it is disassembled. The lenght is critical to pump performance.

• Disassemble and clean the diffusion pump
• Replace the heater
• Reassemble, reinstall and fill the diffusion pump with new oil

Diffusion pump oil replacement	
Volume filled/changed (ml):	0

• Verify the condition of the rotary pump oil mist filter, clean, inspect or replace as required
• Verify the condition of the rotary pump oil mist filter O-ring, clean, inspect for damage and/or deformation, replace as required
• Verify the functionality of the pirani gauges and the penning gauge, clean, inspect or replace as required

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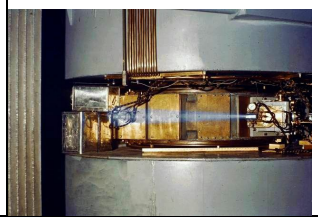
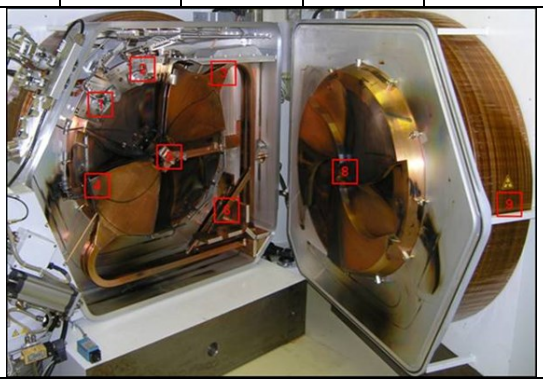
PHOTO:	**Photo name: cyclo**  **Photo name: cyclotron** 

MAINTENANCE TRACKING TOOL

Chamber

Survey	Date: 2022-11-16					Time: 11:25				
EOB	Date: 2022-11-16		Time: 11:25			H: 50		Time after EOB in hour : 5.0		
Survey point	1	2	3	4	5	6	7	8	9	10
Probe dose rate (mSv/h)	6.0	7.0	9.0	1.0	3.0	8.0	5.0	9.0	4.0	8.0



Targets

• Disconnect all targets from the service PC

• Switch off the manual water valves to the targets on the water manifold (the large wall mounted water manifold)

NOTE! 18F2 Deuteron target system requires NEON gas flushing before opening of connections.

NOTE! 18F2 Proton target system requires ARGON gas flushing X 3 before opening of connections.

NOTE! Do not disconnect the C11CH4 target, any atmosphere entering this target may ruin the target.

• Physically disconnect all targets from the cyclotron and transport them to safe/shielded location

• Verify condition and functionallity of the beam exit valves (BEV), repair or replace as required

BEV & Compressed air Tubing: annual replacement for BEV/ 3 years replacement for air tubing

Target position	**T1**	**T2**	**T3**	**T4**	**T5**
Date of the last BEV replacement:	APR2019	NA	NA	APR2019	NA
Action Performed (Y/N)	N	NA	NA	N	NA
Date of the last compressed air tubing replacement	APR2019	NA	NA	APR2019	NA
Action Performed (Y/N)	N	NA	NA	N	NA

Cyclotron

WARNING! Pinch hazard.

• Check the screws between yoke actuator and cyclotrons chassis: remove them, inspect for damage and if damaged replace them, otherwise put them back.

• Remove the magnet door bolt, inspect for damage. If damaged repair or replace, otherwise regrease to make it prepared for installation.

• Verify the magnet door functionality, the play between the yoke and the magnet, re-adjust as required, record play

Yoke to magnet play

Recorded play (mm):	5	**Limit 2-10mm**

RF flaps

• Verify flap and flap drive function, calibrate, repair and/or replace as required, read and record the current

Flap motor current

	Flap 1	**Flap 2**
Recorded current (mA):	82	117

• Verify the flap to DEE play, readjust as required, read and record

Flap to DEE play

Flap number	**0% (4mm +0,5/-0)**	**50% (>4 - <2mm)**	**100% (>26mm)**	**Working Position**
1:	4.34	11.72	34.52	NA
2:	4.84	11.82	31	NA

Central region

• Verify the DEE tip condition, replace if worn and/or damaged

NOTE! This action is only to be executed if the Ion-Source requires maintenance and/or replacement.
NOTE! Ion-Source maintenance may require paper burn to verify beam position in target.
• Read and record ion source adjustment, replace the anode assembly (ion source 'block' with anode/s and cathodes), re-read and record the adjustment

Ion source adjustment (with dummy anode)

Location	Recorded distance (mm)	Typically (mm)
	After	
A:	0.45	0,9-1,2
B:	0.75	0,3-0,5
C:	0.4	0,4-0,6
D:	0.75	1,1-1,3

• Verify flip-in probe condition, position, insulation and functionality, reposition and/or replace as required, read and record

Flip-in probe insulator surface reading

Recorded reading (kΩ):	29.5	Typically 29,4kΩ

• Read and record DEE settings, adjust as required (refer to original factory settings, if adjusted re-read and record

DEE settings

Measurement point	Height (mm)	Thickness (mm)	Theoretical midplane from pole (mm)	Actual midplane from pole (mm)	Variance (max 0,5mm)
Dee1 tip top (A):	46.20	33.20	30	29.6	0.4
Dee1 upper corner (B):	74.10	33.10	58	57.55	0.45
Dee1 lower corner (C):	47.10	33.50	30	30.35	-0.35
Dee1 tip lower (D):	46.40	33	30	29.7	0.3
Dee2 lower tip (E):	74.30	33.40	58	57.6	0.4
Dee2 lower corner (F):	47.10	33.80	30	30.2	-0.2
Dee2 upper corner (G):	74.90	33.20	58	58.3	-0.3
Dee2 upper tip (H):	75.00	33.50	58	58.25	-0.25
Stem 1 (I)	100.50	NA			
Stem 1 connecting block (J)	102.00	NA			
Stem 2 (K)	101.00	NA			
Stem 2 connecting block (L)	102.00	NA			

NOTE! Do not touch or clean the DEE pick ups.

• Verify thightness of the DEE and the stem screws, re-tighten if required

Extraction

• Verify foil condition, in case of >3 broken foils; replace the carousel and transport the replaced unit to a safe/shielded location for decay

• Verify functionality and status of the limit switches, repair and/or replace as required

• Verify capton cable condition, repair and/or replace as required

• Verify carousel turn mechanism functionality, repair and/or replace as required

• Verify that the carousel insulation, repair and/or replace as required, read and record resistance

Carousel insulation (ground resistance)

Recorded resistance extraction 1 (carousel to carrier) (kΩ):	29	Typically 29.4kΩ
Recorded resistance extraction 2 (carousel to carrier) (kΩ):	29.45	Typically 29.4kΩ
Recorded resistance extraction 1 (cable to carrier) (kΩ):	500	>500kΩ
Recorded resistance extraction 2 (cable to carrier) (kΩ):	501	>500kΩ

• Verify extraction drive mechanism functionality, the balance functionality, repair and/or replace as required, calibrate, read and record the motor current

Extraction and balance motor current

Maximum recorded current extraction 1 (mA):	142	Limit 50-200 mA
Maximum recorded current extraction 2 (mA):	101	Limit 50-200 mA
Maximum recorded current balance (mA):	120	Limit 100-300mA

Collimators

• Verify collimator condition, openings, re-adjust, repair and/or replace as required, read and record insulation

Collimator readings

Collimator position	Insulation (recorded ground resistance) (typically 29,4kΩ)	Horizontal opening (mm)	Vertical opening (mm)
1 (lower)	29.46	1	10
1/2	29.48	0	0
2/3	0	0	0
3/4	29.46	1	10
4/5	29.45	0	0
5/6	0	0	0
6 (upper)	0	0	0

• Verify target clamps insulation, repair and/or replace as required, read and record insulation

Target clamps insulation (ground resistance)

Target clamp position	Recorded resistance (typically 20,4kΩ)
T1	20.07
T2	0
T3	0
T4	20.07
T5	0
T6	0

Tank

• Verify that no parts are; burned, covered by aluminum oxide (sputtered), foreign material and/or other contamination, replace parts as required and document by photo

• Verify that no damage, contamination and/or deformation are present on the vacuum tank o-ring, replace as required, otherwise clean and regrease

• Verify that the finger contacts are properly secured in place and that no damage and/or deformation are present, reinstall and/or replace as required

• Verify that the silicon baffles are properly fitted and tightly secured at their locations and that no damage are present, tighten and/or replace as required

• Verify that the the screen plate and the screws for the covers at the top right inside of the tank are securely attached and that no damages are present, if required tighten and/or replace

Water cooling

• Switch on the secondary water cooling (Swedewater), let it run for at least 10 minutes, verify normal operation'

• Verify that no leaks are present on the water manifold (target panel), the magnet connections, the RF system, the ion-source system, the PSMC, repair and/or replace as required

• Verify the condition of the water cooling lines for the targets, if hard or brittle, replace as required

• Turn off the main water cooling pump on the secondary water cooling system (Swedewater) (optional: perform only in case of cooling problems)

• Inspect and replace filter Z2 at the Swedewater (optional: perform only in case of cooling problems)

• Inspect and clean filter Z1 and Z3 at the Swedewater (optional: perform only in case of cooling problems)

• Verify water conductivity and flow at the Swedewater, if conductivity error has occurred/occurrs during production, replace the ion exchanger resin (normally once a year)

• Off mode: Verify water level and pressure at the Swedewater, re-fill and/or adjust as required, read and record

Secondary water cooling system (Swedewater) system off data

Water volume filled (ml):	NA	If fill is not required, mark N/R
Static pressure compressed air (kPa):	52	Limit 40-200 kPa

• On mode: Verify water cooling system readings, adjust as required, read and record

Secondary water cooling system (Swedewater), system on data

Expansion vessel BP1 (bar):	0,51
Main pump pressure BP2 (bar):	7,5
Vacuum cooling pump BP3 (bar) (if present):	NA
System temperature BT1 (degree C):	19,5
Temperature alarm (degree C):	15-25
Cooling water out temperature BT2 (degree C):	15
Cooling water in temperature BT3 (degree C):	12
Deonizer flow BF10 (liter/min):	1,5
Conductivity BQ1 (µS cm-1):	0,142

Targets

• Replace LTF peek (Optional operation)

• Verify the condition of the water cooling tubes, if hard or brittle, replace as required

Annual maintenance: Check of the PDU terminal screws

For the PDU, yearly check to be done:

• If Vacuum still OFF, stop the swedewater pump and then turn off the power of the PDU

• Put the gloves and helmet for electrical interventions

• Check and if needed tigthen the terminal screws inside the PDU

End of inside-bunker operations

• Install the paper burn target

• Verify the sealing of the target gasket

• Close the bunker before restart the vacuum

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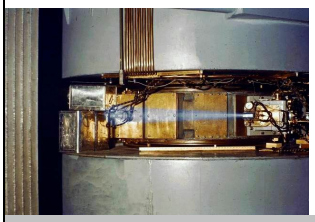
PHOTO:	**Photo name: APR2019**  **Photo name: APR2019** 

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MAINTENANCE TRACKING TOOL

Beam

Beam

• Perform a paper burn test in DB for both targets

• Dismount the paper burn targets and put the standard targets in place

• Check the He flow inside flowmeters fot both target in SB and DB and close the bunker

• At the Service System: Connect targets and verify target vacuum tightness, repair and/or replace as required
• At the Service System: Select FILL TARGET (for F18 target select: O16 water) and verify the fill volume verify that the target pressure increases in accordance with the specification for the specific target type, adjust, repair and/or replace as required
• Verify that the vault door are closed
• Connect the Service System to the ACU and power up the Service System, set the master to local and log in to the Service System
NOTE! Only Service System: BEAM CONTROL and TARGET pages are to be utilized.
• Start the water cooling, verify vacuum system status at the VCU, set magnet to on and set configuration value
• Set RF to STANDBY, select target and set the extraction foil to the selected target position, park the other extraction foil
• Set the flip-in probe to: IN, select H- particle, set RF to NORMAL
• Verify Ion-source gas, turn on the Ion-source and set to 50mA, verify current on the flip-in probe and set flip in probe to OUT
NOTE! Maximum collimator and tuning (extraction foil current) current is 10µA.
• Read and record the target, the foil, the collimator current, adjust the extraction foil until equal collimator current is achieved
• Adjust the magnet current, the RF DEE voltage, the RF delta DEE voltage, the extraction foil current and the gas flow to achieve optimal beam

Beam performance

Beam performance	H-
Magnet current (A):	430
DEE voltage :	34
Delta Dee Voltage	1
Ion source current (mA):	98
Ion source voltage (kV):	1012
Gas flow (sccm):	4
Flip-in probe current (IFLIP (µA)):	98,3
Target 1 position/type:	31
Target 2 position/type:	7
Foil 1 current	30
Foil 2 current	30
Collimator lower 1 current	16
Target 1 current	25
Collimator upper 1 current	1
Collimator lower 2 current	2
Target 2 current	25
Collimator upper 2 current	2
Target 1 beam width (Col lower+Col upper / Itarget in%)	12
Target 2 beam width (Col lower+Col upper / Itarget in%)	16
Extraction foil current (IEXT (µA)):	60
Transmission Target 1 = ITAR/Ifoil	97
Transmission Target 2 = ITAR/Ifoil	99
Acceleration Efficiency = Ifoil/Iprobe (H > 60%)	61
ISEFFICIENCY=IFLIP/IARC (H- >0.20, D- >0.10) (µA/mA):	1

Water cooling system (Swedewater), with beam-on

Expansion vessel BP1 (bar):	NA
Main pump pressure BP2 (bar):	NA
Vacuum cooling pump BP3 (bar):	NA
System temperature BT1 (degree C):	NA
Cooling water out temperature BT2 (degree C):	NA
Cooling water in temperature BT3 (degree C):	NA
Deonizer flow BF10 (liter/min):	NA
Conductivity BQ1 (µS cm-1):	NA

Water cooling system (Swedewater), with beam-on

External temperature	0.0
	Valve position
Cyclotron in standby condition	0.0
After 1 hour of irradiation	0.0
After 2 hour of irradiation	0.0

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MAINTENANCE TRACKING TOOL

ACU

ACU

NOTE! If readings are out of specification,the problem could come from the power supply or a ground fault.
• Verify ACU voltages

ACU voltages

Test point	Reading	Range
GND_IO (24V):	24.02	+24 ± 1,2
GND_IO (+15V):	15.08	+15 ± 0,75
GND_IO (-15V):	-15.08	-15 ± 0,75
GND (+5V):	4.77	+5 ± 0,25
Chassis (GND_IO):	0.22	< 1V

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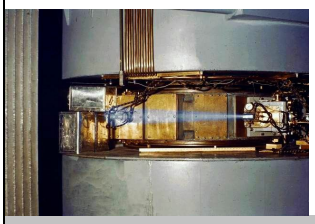
PHOTO:	**Photo name: APR2019**  **Photo name: APR2019** 

MAINTENANCE TRACKING TOOL

PSMC

PSMC

• Switch off the PSMC main power
• Open the PSMC back door and remove one of its side covers
• Verify that the PSMC has no water leaks, loose cables, burn marks or broken parts, verify air filter condition, adjust and/or replace as required
• Verify the PSMC resistance values, read and record

PSMC resistance	
Resistance between negative (-) and positive (+) (Ω):	0.34
Resistance between positive (+) and ground (Ω):	2.21
Resistance between negative (-) and ground (Ω):	2.20

WARNING! High power and current

• Switch on the PSMC power
• Ramp up the magnet to the H- configuration value, read and record the ramping time

Magnet ramping up sequence		
On sequence ramping speed (A/second):	7.14	**Typically 6A/second**
On sequence ramping up time to maximum (minutes):	1.10	**Typically 1 minute 30s**
On sequence ramping up time to configuration value (seconds):	10.00	**Typically 15 seconds**

• Verify PSMC output current and voltages, adjust and/or repair as required, read and record
• Verify PSMC voltage regulation stability (voltage reading during 10 seconds should not vary more than 0.1 V)

PSMC H- output current and voltages				
Parameter	**10%**	**50%**	**100%**	**H- config value**
Current setting PSS (10% 50±1, 50% 250±1, 100% 499±1 A):	50.00	250.00	499.00	430.00
Current PSS (10% 50±1, 50% 250±1, 100% 499±1 A):	45.00	247.00	499.00	429.00
Voltage read PSS (10% 12±1, 50% 41±1, 100% 80±1 VDC):	45.00	43.00	77.00	65.00
Coil voltage (10% 7±1, 50% 40±1, 100% 80±1 VDC):	7.00	38.00	77.00	66.00
Thyristor firing sequence (<20 peaks in 20 ms)	0.00	0.00	0.00	0.00
Frequency (Hz):	600.00	600.00	600.00	600.00
Ripple 2±0,5 (true rms) (VAC):	0.15	0.25	0.18	0.19

• Ramp down the magnet, read and record, switch off the PSMC power

Magnet ramping down sequence		
Off sequence ramping down (minutes):	1.10	**Typically 1 minute**

NOTE! Do not forget to connect the ground wire to the side cover/s.
• Close the PSMC back door and reinstall the side cover/s, switch on the PSMC power
• Verify fan and interlock functionality, adjust, repair and/or replace as required

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MAINTENANCE TRACKING TOOL

RFPG

RFPG

WARNING! High voltage (up to +7800V DC).

• Switch off the power to the RFPG

• Open the TAU and verify that the grounding device is operational (completely in contact with the RF tube). Verify that no burn marks, loose cables or leaking water are present, clean, repair and/or replace as required, close the TAU

• Open the GSPU and verify that no burn marks or loose cables are present, clean, repair and/or replace as required, close the GSPU

• Open the DPA and verify that no burn marks, loose cables or leaking water are present, clean, repair and/or replace as required, close the DPA

• Replace the RFPG air inlet filters, clean the front grid cover, inspect the grid of the back of the cabinet, clean if required

WARNING! High voltage (up to +7800V DC). It is important to discharge components before removal of rectifier diode/s.

• Open the TPSU, verify TPSU diode status (48 diodes), diode bridge should read 0,8-0,9V forward voltage drop from negative (-) pin to positive (+) pin. A defective diode bridge will read close to/or 0V, repair and/or replace as required

• Verify tightness of the TPSU terminal screws TBL 1, TBL 2, TBL 3, tighten and/or replace as required, close theTPSU

• Verify water cooling pressure, repair and/or replace as required, read and record

RFPG water cooling pressure	
Pressure reading (bar):	2.50

• Switch on the RFPG and verify the functionality of the RFPG fans, repair and/or replace as required, reinstall all covers

• Open the DPSU, visually verify that no components are loose or appears to be damged, repair and/or replace as required

• Verify the voltage output in the DPSU, adjust, repair and or replace as required, read and record. Re-install the DPSU

DPSU voltage

Parameter	Voltage	Ripple (peek to peek)	Voltage limits/ripple limit
+48V (V1):	47.81	1.34	**47.5-48.5 VDC/200mV**

• Verify SCU functionality for H-, adjust, repair and/or replace as required, read and record

H-, at the PSS magnet page: switch on the water cooling and the magnet, set the magnet to the H- configured value, read and record the OFF value as displayed on the measurement module/ the PSS

H-, at the PSS RF page: Select STANDBY, after 1 minut RF state should be: STANDBY READY, read and record the STANDBY value as displayed on the measurement module/the PSS

Verify VAC voltage and ripple at the load phase detector board

H-, at the PSS RF page: Select NORMAL, let the RF run for one hour, read and record the H- (__kV) value as displayed on the measurement module/the PSS, in case of any significant change in any value, adjust, repair and/or replace as required

When finished, download the statistics log, the two milliseconds logs and the five seconds log.Save the log files in the backup folder in the service laptop, C:\backup\scu.

If there are any significant change in any value, investigate the reason. Pay special attention to the analog in voltages, humidity and temperature, adjust, repair and/or replace as required

If there are any significant change in any value, investigate the reason. Pay special attention to the analog in voltages, humidity and temperature, adjust, repair and/or replace as required

At the PSS RF page: Select STANDBY, RF shall change state to: STANDBY READY

RFPG

SCU readings

PSS	RFPG status		
Parameter/unit	Off/standby	H- (35kV)	
		0 hour	0.5 hour
DEE voltage ref (V):	33.90	33.90	33.90
DEE voltage read 1 (V):	0.00	34.00	34.00
DEE voltage read 2 (V):	0.00	34.00	35.00
RF fwd voltage (V rms):	0.00	-0.20	-2.00
RF reflected voltage (V rms):	0.00	0.00	0.00
DPA RF FWD voltage (V rms):	3.00	74.00	71.00
FWD power (kW):	0.00	8.00	8.34
Reflected power (kW):	0.00	0.08	0.03
Anode voltage (kV):	0.00	7.86	7.93
Anode current (A):	0.00	1.99	2.00
Grid voltage (V):	-3.00	-257.00	-257.00
Grid current (A):	0.00	-0.12	-0.12
Screen voltage (V):	-3.00	48.00	849.00
Screen current (mA):	2.00	51.00	50.00
Heater voltage (V rms):	6.21	6.22	6.20

PSS readings

DEE voltage set (kV):	34.00
DEE voltage read (kV):	34.00
Delta DEE voltage set (kV):	1.00
Delta DEE voltage read (kV):	34.90
FWD power (kW):	8.40
Reflected power (kW):	0.10
Phase error (degrees):	4.00
H- start flap I (%):	28.00
H- start flap II (%):	23.20
D- start flap II (%):	0.00
D- start flap I (%):	0.00

Voltages on load phase detector board

Parameter	Recorded voltage	Ripple peak to peak	Voltage limits/ripple limit
3.3V	3.27	1.12	3.2V-3.5V/50mV
TP1 +15V (V3+):	14.92	2.10	13,5-16,5VDC/50mV
TP2 -15V (V4-):	-15.10	2.34	-16,5--13,5VDC/50mV
TP3 +5V (V1+):	5.15	4.82	4,5-5,5VDC/50mV
TP4 +24V (V2+):	23.70	24.18	21,6-26,4VDC/50mV

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MAINTENANCE TRACKING TOOL

Ion-Source

Ion-Source

• At the PSS Ion-source page: Verify gas flow regulator functionality by selecting H-, set value and read out is to match and zero setting is to provide zero reading, read and record

Gas handling

Checkpoint	Set value	Reading	
H2 gas pressure (bar):	4.00	4.00	• Read the value on the last stage of the supply line

• Switch on the H- gas and set to your normal value verify that the flip in probe is in and switch on the Ion-source, set to 50mA

• Start the IS conditioning procedure : turn ON Ion source and leave it at a current of 20 mA for 10 minutes

• NOTE! Probe reading of 200µA should be displayed prior to 600mA on the Ion-source

• Switch on the H- gas, set to 5,0ml/minut, verify that the flip in probe is, switch on the Ion-source, set to 50mA, read and record the Ion-source current/voltage and the probe current, proceed by 50mA increase steps until 200µA on probe are displayed

H- burning properties

Gas 5,0ml/minut	DEE 1(kV)	DEE 2 (kV)	Magnet (A)
4.00	36.00	1.50	429.80
Ion-source current (mA)	**Ion-source voltage (V)**		**Flip in probe current (µA)**
48.00	1272.00		43.00
68.00	1233.00		87.00
98.00	1076.00		154.00
118.00	975.00		204.00
147.00	862.00		268.00
166.00	801.00		310.00
198.00	728.00		363.00
158.00	453.00		698.00
200.00	684.00		452.00
315.00	657.00		157.00

• Repeat operation for D- with gas at 3,5ml/minut. At the PSS: Switch of the Ion-source and set RF to STANDBY

• At water manifold 1: Open the two water valves for the upper and the lower targets as per system configuration

NOTE! Verify that all required gas supplies are adequate, that all target media is available and activated as per system configuration, and that a vial is connected to the end of the delivery line. If gas supplies and/or target media levels are becoming low and/or are empty, inform the customer.

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