EXPERIENCE. INGENUITY. PERFORMANCE.

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10;11 nr.

Extended Warranty and ACSI Service Structure

This document is an overview of the extended warranty that ACSI are offering for consideration as a part of the submission in response to the tender. Additionally, based on Customer specific needs, a customized plan can be developed.

Warranty Terms

Advanced Cyclotron Systems Inc. (ACSI) warrants that each item of the delivered equipment will be of material and workmanship free from defects for the duration of the warranty period.

To give this warranty, ACSI requires that no person other than operators certified in writing by ACSI shall operate and maintain the equipment. The buyer and its operators are required to use due care in the operation and maintenance of the equipment, including keeping accurate records of use, maintenance, and repairs, for review by ACSI at its discretion. Warranty coverage excludes consumable items (foils, filters, filaments, etc.) and items damaged by operation not in accordance with ACSI's operations and maintenance manuals. Wear and tear on system components is expected and will be taken into account when warranty issues are being decided.

If the equipment, or any part thereof, is or becomes defective within the warranty period, then if requested by the buyer, ACSI at its option and expense, shall:

- Have the equipment or parts thereof repaired at the point of manufacture; or
- Repair or correct such equipment or parts thereof at or near the site; or
- Replace equipment or parts thereof to the extent necessary to cause it to meet the warranty

Parts requiring repair or replacement will be shipped at the buyer's expense back to an authorized ACSI Service Centre. ACSI will supply the parts required to repair or replace defective equipment or parts thereof. The costs of rendering the system safe and suitable for the undertaking of repairs shall be under the responsibility and expense of the buyer. The cost of reinstalling repaired or replaced equipment or parts shall be borne by ACSI.

Definitions:

Remote technical support and diagnostics via telephone and remote connection

An operator will be available to answer customer support calls 24 hours a day, 7 days a week. On-call ACSI Specialist will be notified immediately and will respond to the support requests. Real-time system monitoring is available via remote connection during business hours or by arrangement.

Scheduled Preventive Maintenance/Training Trips

Scheduled trips will be planned and incorporated into the customer's production schedule. A preventive inspection will be conducted and an extensive maintenance will be performed as deemed appropriate by the ACSI Specialist. One ACSI Specialist will be dispatched for the scheduled visit, which shall have duration of up to five days of work on site. The customer may also take advantage of these visits by asking the ACSI Specialist to host training sessions.

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Emergency Service Trips

An ACSI Specialist will be dispatched as soon as it is determined that this is the appropriate course of action. Arrival on site is expected within 48 hours, subject to the flight schedules available at time of booking. ACSI understands the crucial nature of this sort of trip, and will do everything in its power to arrive expeditiously.

The duration of each visit shall be up to four working days on site, depending on the tasks to be performed.

ACSI Service Organization Structure

ACSI's service, engineering and production are headquartered in the Vancouver Metropolitan area (Richmond, BC) in Canada. Additionally, ACSI has established a network of service centers through agencies or partner organizations capable of delivering full line of service to ACSI's Customer. This network is distributed around the globe providing services in their respective geographical areas:

North America	serviced from ACSI headquarters
Europe and Middle East	ACSI service center and parts depot located in UK (Sheffield) Service centers - Italy (Bologna); Czech Republic (Prague)
East and South Asia	ACSI service center and parts depot located in Japan (Tokyo) Service center – China (Beijing)
Russia and Central Asia	Service centers – Istanbul (Turkey); Russia (Ekaterinburg)

A comprehensive inventory of consumables and spare parts is maintained by ACSI at its headquarters, along with a supply chain structure prepared to have parts delivered to customers expeditiously and reliably. ACSI's global service centers are also prepared to supply the most critical items in their geographical areas.

Customer Support is available on 24 hours per day and 7 days a week basis to Customers covered by warranty or by a service agreement, through a hotline number (+1.604.276.1493) and email address (support@advancedcyclotron.com). In addition to collecting basic information on the Customer and the issue being reported, the hotline representative can transfer the Customer directly to the ACSI's Specialist on-call. Email communication is managed directly by the technical Specialist on-call, and accessible to all technical Specialists. These approaches provide our Customers with a short, transparent and reliable path to ACSI's expertise. Remote cyclotron access is another powerful tool to troubleshoot the system or to clarify an operational question. ACSI offers remote access service to Customers through TeamViewer (the corporate license held by ACSI allows its Customers to use the free client supplied by TeamViewer).

To ensure system security the Customer does not need to share computer/network login information with ACSI, the session password scheme provided by TeamViewer ensures that, before any remote access by ACSI is initiated, it is first authorized by the Customer (no unattended access), and that the Customer can supervise and retain control of the session at all times (no stealth access).

Levels of Service. Service activities are structured in 3 levels. Each level defines a category of service activities and type of equipment maintenance performed by adequately trained cyclotron specialist.

Level 1 service is focused on the routine maintenance of the cyclotron sub-systems including basic equipment repairs and problems identification. Level 1 service is typically provided by customer's cyclotron operator.

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Level 2 service requires a deeper knowledge of the cyclotron system which comes with in-depth training p rovided by ACSI and more extensive experience of operating TR cyclotron, including system t roubleshooting and repair. This type of service is typically provided by customer's adequately trained c yclotron engineer, or experienced technician, ACSI regional service representative or ACSI staff.

Level 3 service required for resolution of serious and unusual equipment malfunctions and breakdowns, or as a part of more extensive system tune-ups and upgrades. This type of service is provided directly by ACSI engineers.

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Išplėstinė garantija ir ACSI aptarnavimo struktūra

Šis dokumentas yra išplėstinės garantijos, kurią ACSI siūlo apsvarstyti kaip dalį į pasiūlymą pateikiamo atsakymo, apžvalga. Be to, atsižvelgiant į konkrečius kliento poreikius, gali būti parengtas individualus planas.

Garantijos sąlygos

„Advanced Cyclotron Systems Inc.“ (ACSI) garantuoja, kad visą garantinį laikotarpį visos pristatomos įrangos dalys bus pagamintos iš medžiagų ir gaminių, neturinčių defektų.

Tam, kad ši garantija būtų suteikta, ACSI reikalauja, kad niekas kitas, išskyrus operatorius, kuriuos ACSI patvirtino raštu, neeksploatuotų ir neprižiūrėtų įrangos. Pirkėjas ir jo operatoriai privalo elgtis atsargiai eksploatuodami ir aptarnaudami įrangą, taip pat privalo vesti tikslius įrašus apie įrangos naudojimą, priežiūrą ir remontą, kuriuos ACSI galėtų peržiūrėti savo nuožiūra. Garantija netaikoma vartojimo reikmenims (folijoms, filtrams, gijoms ir t. t.) ir daiktams, pažeistiems dėl eksploatavimo, neatitinkančio ACSI operacijų ir priežiūros vadovų. Sistemos komponentų susidėvėjimas yra tikėtinas, ir į tai bus atsižvelgta, kai bus sprendžiami klausimai dėl garantijos.

Jei įranga ar bet kuri jos dalis per garantinį laikotarpį sugenda ar atsiranda jos defektų, pirkėjui paprašius, ACSI savo pasirinkimu ir sąskaita turi:

- suremontuoti įrangą ar jos dalis gamybos vietoje arba
- suremontuoti ar pataisyti tokią įrangą ar jos dalis naudojimo vietoje ar šalia jos, arba
- pakeisti įrangą ar jos dalis tiek, kiek tai būtina pagal garantiją.

Dalys, kurias reikia suremontuoti ar pakeisti, pirkėjo sąskaita bus išsiųstos įgaliotajam ACSI aptarnavimo centrui. ACSI pateiks dalis, kurių reikia siekiant suremontuoti arba pakeisti sugedusią įrangą arba jos dalis. Išlaidas, susijusias su sistemos saugumo ir tinkamumo užtikrinimu atliekant remontą, savo sąskaita padengia pirkėjas. Suremontuotos ar pakeistos įrangos ar jos dalių pakartotinio įdiegimo išlaidas padengia ACSI.

Apibrėžimai

Nuotolinis techninis palaikymas ir diagnostika telefonu ir nuotoliniu ryšiu

Operatorius galės atsakyti į klientų aptarnavimo telefono skambučius 24 valandas per parą, 7 dienas per savaitę. Budintis ACSI specialistas bus nedelsiant informuotas ir atsakys į užklausas. Sistemos stebėjimas realiuoju laiku yra prieinamas nuotoliniu ryšiu darbo valandomis arba susitarus.

Reguliarios prevencinės priežiūros / mokymų kelionės

Reguliarios kelionės bus suplanuotos ir įtrauktos į kliento gamybos tvarkaraštį. Bus atlikta profilaktinė apžiūra ir išsami techninė priežiūra, kuri, ACSI nuomone, bus tinkama. Vienas ACSI specialistas bus išsiųstas numatytam vizitui, kurio trukmė – iki penkių dienų darbo vietoje. Klientas taip pat gali pasinaudoti šiais vizitais, paprašydamas ACSI specialisto surengti mokymus.

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Avarinio aptarnavimo kelionės

ACSI specialistas bus išsiųstas, kai tik bus nustatyta, kad tai yra tinkamas veiksmų planas. Atvykimas į vietą numatomas per 48 valandas, atsižvelgiant į skrydžių tvarkaraščius, kuriuos galite peržiūrėti rezervavimo metu. ACSI supranta lemiamą tokio pobūdžio kelionių pobūdį ir padarys viską, kas įmanoma, kad atvyktų kaip įmanoma greičiau.

Kiekvieno vizito vietoje trukmė yra iki keturių darbo dienų, atsižvelgiant į atliekamas užduotis.

ACSI paslaugų organizavimo struktūra

ACSI paslaugų, inžinerijos ir gamybos būstinė yra Vankuverio metropolijos srityje (Ričmondas, BC) Kanadoje. Be to, ACSI įsteigė paslaugų centrų tinklą per agentūras ar organizacijas partneres, galinčias teikti visą paslaugų liniją ACSI klientams Kanadoje. Šis tinklas yra paskirstytas visame pasaulyje ir teikia paslaugas atitinkamose geografinėse vietovėse:

Šiaurės Amerika	aptarnaujama iš ACSI būstinės ACSI techninės priežiūros centras ir atsarginių dalių sandėlis yra JK (Šefilde). Aptarnavimo centrai – Italijoje (Bolonijoje), Čekijoje (Prahoje).
Europa ir Viduriniai Rytai	ACSI priežiūros centras ir atsarginių dalių sandėlis yra Japonijoje (Tokijuje).
Rytų ir Pietų Azija	Aptarnavimo centras yra Kinijoje (Pekine).
Rusija ir Centrinė Azija	Aptarnavimo centrai yra Stambule (Turkijoje), Rusijoje (Jekaterinburge).

ACSI savo būstinėje tvarko visą vartojimo reikmenų ir atsarginių dalių inventorių, taip pat tiekimo grandinės struktūrą, parengtą taip, kad dalys būtų greitai ir patikimai pristatomos klientams. Pasauliniai ACSI paslaugų centrai taip pat yra pasirengę tiekti svarbiausias prekes savo geografinėse vietose.

Klientų aptarnavimo paslaugos teikiamos 24 valandas per parą 7 dienas per savaitę klientams, kuriems taikoma garantija arba tiems, kurie yra sudarę paslaugų sutartis, karštosios linijos telefono numeriu + 1 604 276 1493 ir el. paštu support@advancedcyclotron.com. Karštosios linijos atstovas gali ne tik rinkti pagrindinę informaciją apie klientą ir problemą, apie kurią pranešama, bet ir tiesiogiai sujungti klientą su budinčiu ACSI specialistu. Komunikaciją el. paštu tiesiogiai tvarko budintis techninis specialistas, ir ji yra prieinama visiems techniniams specialistams. Šie metodai suteikia mūsų klientams trumpą, skaidrų ir patikimą kelią į ACSI patirtį. Nuotolinė ciklotrono prieiga yra dar vienas galingas įrankis šalinti sistemos gedimus ar išsiaiškinti operacinius klausimus. ACSI siūlo nuotolinės prieigos paslaugas klientams per „TeamViewer“ (ACSI turima įmonės licencija leidžia savo klientams naudoti nemokamai suteikiamą „TeamViewer“ paslaugą).

Siekiant užtikrinti sistemos saugumą, klientui nereikia dalintis kompiuterio / tinklo prisijungimo informacija su ACSI, „TeamViewer“ teikiama sesijos slaptažodžio schema užtikrina, kad prieš pradedant bet kokią nuotolinę ACSI prieigą, klientas pirmiausia ją įgalioja (nėra neprižiūrimos prieigos), ir kad klientas gali bet kuriuo metu prižiūrėti ir išlaikyti sesijos kontrolę (nėra užslėptos prieigos).

activities and type of equipment maintenance performed by adequately trained cyclotron specialist.

Aptarnavimo lygiai. Aptarnavimo veikla suskirstyta į 3 lygmenis. Kiekvienas lygis apibūdina aptarnavimo veiklos kategoriją ir įrangos priežiūros, kurią atlieka tinkamai apmokytas ciklotrono specialistas, tipą.

1 lygio paslauga yra orientuota į įprastinę ciklotrono posistemių priežiūrą, įskaitant pagrindinius įrangos remontus ir problemų nustatymą. 1 lygio paslaugą paprastai teikia kliento ciklotrono operatorius.

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2 lygio paslauga reikalauja gilesnių žinių apie ciklotrono sistemą, kurios gaunamos iš ACSI teikiamų išsamių mokymų, ir išsamesnės TR ciklotrono naudojimo patirties, įskaitant sistemos gedimų šalinimą ir taisymą. Tokio tipo paslaugas paprastai teikia tinkamai apmokytas kliento inžinierius arba patyręs specialistas, ACSI regiono atstovas arba ACSI personalas.

Level 3 service required for resolution of serious and unusual equipment malfunctions and breakdowns, or as a part of more extensive system tune-ups and upgrades. This type of service is provided directly by ACSI engineers.

3 lygio paslauga, reikalinga norint išspręsti rimtus ir neįprastus įrangos sutrikimus ir gedimus arba atlikti platesnio masto sistemos derinimus ir atnaujinimus. Tokio tipo paslaugas tiesiogiai teikia ACSI specialistai.

Vertimas atliktas vertimų biure „AIRV“, į. k. 134819573, Raugyklos g. 4ª / Šv. Stepono g. 7, Vilnius.
Vertimo tikrumą ir atitiktį originaliam tekstui liudiju.

Vertėja
Translator / Переводчик
Goda Remeikaitė

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Vertimas atliktas vertimų biure „AIRV“, į. k. 134819573, Raugyklos g. 4ª / Šv. Stepono g. 7, Vilnius.
Vertimo tikrumą ir atitiktį originaliam tekstui liudiju.
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Service Plan and TR-19 Cyclotron Maintenance

This document is an overview of the service plan that ACSI are offering for consideration as a part of the submission in response to the tender. Details and conditions will be defined in the final service agreement. Additionally, based on Customer specific needs, a customized plan can be developed.

The additional information regarding servicing ACSI cyclotrons is given below, in:

- ACSI non-warranty service rates for year 2020
- Price list for cyclotron consumables and spare parts

Proposed Service Plan and Extended Warranty Options

A balanced service plan with 24/7 remote access to technical support from ACSI team, one preventative and one emergency service trip and 10% discount for parts and additional services. Additionally, under this service plan customer will receive 10% discount for the system upgrades that might become available during the duration of the service agreement.

Service plan and extended warranty benefits are summarized in the table below

Benefits	Service plan
Remote technical support (9am-5pm Pacific Time)	
Remote technical support (24/7)	
Discount on parts & additional service	10%
Discount on upgrades	10%
Preventative Service Visits per year	1
Emergency Service Visits per year	1
Price per year, Euro	XXXX

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Definitions:

Remote technical support and diagnostics via telephone and remote connection

An operator will be available to answer customer support calls 24 hours a day, 7 days a week. On-call ACSI Specialist will be notified immediately and will respond to the support requests. Real-time system monitoring is available via remote connection during business hours or by arrangement.

Discount on Parts and Service

Any purchase from ACSI of parts or labour will be discounted from the ACSI list price at the time of purchase (or as per a specific quote in which the discount will be applied).

Scheduled Preventive Maintenance/Training Trips

Scheduled trips will be planned and incorporated into the customer's production schedule. A preventive inspection will be conducted and an extensive maintenance will be performed as deemed appropriate by the ACSI Specialist. One ACSI Specialist will be dispatched for the scheduled visit, which shall have duration of up to five days of work on site. The customer may also take advantage of these visits by asking the ACSI Specialist to host training sessions.

Emergency Service Trips

An ACSI Specialist will be dispatched as soon as it is determined that this is the appropriate course of action. Arrival on site is expected within 48 hours, subject to the flight schedules available at time of booking. ACSI understands the crucial nature of this sort of trip, and will do everything in its power to arrive expeditiously.

The duration of each visit shall be up to four working days on site, depending on the tasks to be performed.

Non-warranty Service Work Rates (year 2020)

The following outlines the rates Advanced Cyclotron Systems (ACSI) will charge for service work performed outside of a formal arrangement (warranty, extended warranty, service agreement, etc.). The customer shall promptly pay the following amounts for the support services described below.

Technical Support

Technical support is available during office hours (9:00 – 17:00, Pacific Time). Support outside of these hours is only available via a 24/7 service plan. Prices are in Canadian dollars.

RATE CODE	RATE (Note 2)	DESCRIPTION
LABOR SITE REG. DAY	€ 3,600	8 hour day; away from the ACSI office
LABOR SITE OVER TIME HOUR	€ 500	1 hour overtime; away from the ACSI office
LABOR TRAVEL DAY	€ 2,500	8 hour travel day; max rate; pro-rated for less
LABOR OFFICE REG. HOUR	€ 300	1 hour; at ACSI office (9:00 – 17:00 PT)

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Site Work.

Beyond the charges above, the customer shall also pay for the necessary flights, as required, along with r easonable lodging and local transportation. ACSI will make every effort to arrange travel in accordance with t he customer's requirements.

Accounting.

An itemized invoice will be prepared by ACSI upon completion of the work. The customer will be informed by an ACSI representative when the work being contemplated is of a nature for which charges will be

Readjustment.

Prices for reference only. ACSI reserves the right to readjust prices from 2021 onwards.

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TR-19 Preventative Maintenance

1. Routine Maintenance Overview

The ACSI TR-series cyclotrons are designed to provide the optimal combination of performance, reliability and serviceability. As with any high performance system, its reliability is a direct result of system operation under the specified parameters and procedures, and the adoption of an effective Preventive Maintenance (PM) program. That includes the weekly, monthly, quarterly, semi-annual and annual activities described below.

The PM program aims to delay the onset of quality degradation, or failure, due to drift of settings, wear & tear, oxidation, consumption, contact loosening due to vibration or cyclic temperature or pressure changes, aging, radiation, dust, etc.

The Preventive Maintenance performed on a regular basis is considered part of the operation of the production system, and therefore are to be performed by the Customer. The required knowledge to perform these activities is provided during the operation training. Depending on the module involved, these activities shall be scheduled on a weekly, monthly, quarterly or semi-annual basis, as specified in the following tables.

PM Event	Duration	Responsible person
Weekly	1 hour	First Line (customer)
Monthly	3-4 hours	First Line (customer)
Quarterly	1 day	First Line (customer)
Semi-Annual	1 day	First Line (customer)
Annual	3 to 5 days	Second Line (ACSI staff or ACSI approved)

The maintenance can be distributed along the specified periods or be scheduled to overlap with, for example, the weekly, monthly, quarterly and semi-annual routines being performed in the same day. The activities can be performed all at once, or be distributed along the applicable period, so the Operator can use the time available in between production runs to complete them.

Depending on personnel availability and how the production schedule is implemented, it is possible to combine several maintenance routines into a single session (filament exchange, foil exchange, target rebuild, etc.), so the regular routines have minimal impact in the production schedule.

2. Annual Preventive Maintenance (PM) Overview

The annual PM involves an extensive inspection of the system, including access to the main tank. In addition to repeating a number of regular routines (indicated by PM under brackets), specific advanced routines are also performed to ensure an extensive analysis of the system. As a result, the PM is expected to last from 3 to 5 working days. During these times, major planned refurbishments, replacements or some corrective maintenance can also occur.

The Annual Preventive maintenance is performed or supervised by an experienced Cyclotron Specialist, qualified as 2nd line of service or above. This type of maintenance is typically performed by ACSI specialist or experienced customer cyclotron engineer, adequately trained and approved by ACSI.

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3. Preventive Maintenance Routines and Checklist

For the TR-19 system, the Preventive Maintenance routines are divided into the following areas:

- RF SYSTEM
- VACUUM SYSTEM
- MAIN MAGNET, CM & SM POWER SUPPLIES
- PROBES
- HIGH VOLTAGE CABINET (ISIS CABINET)
- ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)
- TARGETRY
- SERVICES

RF SYSTEM				
Item	Routine description	Frequency	Responsibility	Signoff / date
1.1	Read & record all meters. Refer to Appendix A.	Weekly (PMI)	Customer	
1.2	Perform visual checks and note any degradation in performance quality.	Weekly (PMI)	Customer	
1.3	Physically inspect cabinets with power off. First inspect ground rod. All surfaces should be dust free. Use a vacuum with discretion for inaccessible spots.	Weekly (PMI)	Customer	
1.4	Check for loose connections and tighten as required.	Monthly (PMI)	Customer	
1.5	Examine boards and components for signs of damage.	Monthly (PMI)	Customer	
1.6	Check transmitter's input, filament, grid, screen parts and connections. If needed, clean parts where dust has accumulated.	Quarterly (PMI)	Customer	
1.7	Dust amplifier cavity with Kim wipes and clean interior with methanol. Clean inner conductor, loop, grounding capacitor and kapton insulator foil.	Quarterly (PMI)	Customer	
1.8	Check air filters. Clean or replace, as needed.	Semi-annually (PMI)	Customer	
1.9	Visually inspect RF vacuum tube (Triode or Tetrode). Check the cables, contacts & filters of the driver & RF synthesizer.	Annually (PMI)	ACSI*	
1.10	Check ARF and CRF related interlocks	Annually (PMI)	ACSI*	

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VACUUM SYSTEM				
Item	Routine description	Frequency	Responsibility (Optional)	Signoff / date
2.1	Check oil level in rotary vane pumps (roughing and backing). If level is low, add oil as per procedure in manual. Ensure oil is not contaminated. If dark, dirty, or turbid, replace it as per procedure in manual.	Monthly (PMI)	Customer	
2.2	Check wire mesh dirt trap in the intake flange centering ring of rotary vane pumps. Clean if necessary.	Monthly (PMI)	Customer	
2.3	Check helium pressure in Cryo pump compressor according to the range specified in the compressor manual. If necessary, recharge helium as per procedure in manual.	Monthly (PMI)	Customer	
2.4	Clean the backing line: disassemble the backing line & push a ball of lint-free tissue soaked in acetone through the copper plumbing. Repeat 4 times. Dry line with heat.	Quarterly (PMI)	Customer	
2.5	Replace copper wool trap and clean all components between the trap and the roughing valves in an ultrasound bath with alkaline detergent.	Semi-annually (PMI)	Customer	
2.6	Regenerate cryopumps according to procedure in maintenance manual.	Semi-annually (PMI)	Customer	
2.7	Calibrate convectron gauges.	Annually (PMI)	ACSI*	
2.8	Replace absorbers in helium compressor.	Every 3 years	ACSI*	

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MAIN MAGNET, CM & SM POWER SUPPLIES				
Item	Routine description	Frequency	Responsibility	Signoff / date
6.1	Confirm that all blue beacons are lit when the Main Magnet is ON.	Quarterly (PMI)	Customer	
6.2	Inspect for any evidence of water leakage.	Semi-annually (PMI)	Customer	
6.3	Ensure fan is working; listen for any obvious sound indicating bearing wear.	Semi-annually (PMI)	Customer	
6.4	Under operating load, touch transformer and choke to ensure they are not excessively hot.	Annually (PMI)	ACSI	
6.5	Measure and record input 3 phase AC voltages and line currents. L1-L2:_____ Vac _____ A L2-L3:_____ Vac _____ A L3-L1:_____ Vac _____ A Compare with previous year's values.	Annually (PMI)	ACSI	
6.6	Measure voltage at PS output and then at the load. Use the current value presented at the control system to calculate the cable + connection resistivity. Check connections if result is above the specified value.	Annually (PMI)	ACSI*	
6.7	Check cooling water flow and compare with the specified value. If a flow lower than 20% is observed, readjust water flow to restore previous value.	Annually (PMI)	ACSI*	
6.8	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - Emergency stop button - Water interlocks - Cabinet door interlocks	Annually (PMI)	ACSI*	
6.9	Check high-current dc connections to ensure integrity of contact: Inspect for any signs of burning. Ensure that all bolts remain fixed.	Annually (PMI)	ACSI*	
6.10	Remove and clean air filters; vacuum interior to remove all dust and dirt; some areas may be blown with compressed air if caution is used.	Annually (PMI)	ACSI*	
6.11	Applicable for CMPS & SMPS only: Visually inspect current transducer for any signs of overheating; Ensure that terminal connections are properly fixed.	Annually (PMI)	ACSI*	

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EXTRACTION PROBES				
Item	Routine description	Frequency	Responsibility	Signoff / date
3.1	Replace carbon foil on extractor probes. Inspect foil holder for signs of wear of damage. Replace foil holder if necessary. *: frequency depends on usage.	Quarterly* (PMI)	Customer	
3.2	Wipe drive mechanisms and inspect for visual signs of wear or damage.	Annually (PMI)	Customer	
3.3	Confirm that probes can move through entire travel range for all axes.	Annually (PMI)	ACSI	

HIGH VOLTAGE CABINET (ISIS CABINET)				
Item	Routine description	Frequency	Responsibility	Signoff / date
4.1	Wipe down High Voltage (HV) cabinet, HV cabinet insulators and HV duct Insulators.	Monthly (PMI)	Customer	
4.2	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - High Voltage Cabinet OK - ISIS Cage - AC Power On - High Voltage Safety	Annually (PMI)	ACSI	
4.3	With all power off, visually inspect interior of cabinet in vicinity of high voltage components for any signs of sparking.	Annually (PMI)	ACSI	
4.4	Confirm that the cooling fan(s) are working; listen carefully to each fan for any obvious sound indicating bearing wear.	Annually (PMI)	ACSI	
4.5	Remove and clean air filters; vacuum interior of cabinet to remove all dirt and dust; wipe inside of doors (do not blow compressed air in this cabinet).	Annually (PMI)	ACSI	
4.6	Check all high current (DC) electrical connections to ensure integrity of contacts. Pay particular attention to the filament and arc power supplies.	Annually (PMI)	ACSI	
4.7	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	

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ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)				
Item	Routine description	Frequency	Responsibility	Signoff / date
5.1	Replace ion source filament whenever current reaches 110A *: frequency depends on usage.	Quarterly*	Customer	
5.2	At every second filament change, replace all items included in the standard filament kit. *: frequency depends on usage.	Semi-annually (PMI)	Customer	
5.3	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	
5.4	Inspect current-limiting resistors connected to plasma & extraction lens. Measure their resistance and compare to the specified values. If any appear burned, affected by radiation, or with a deviation of 10% of specified value, have it replaced.	Annually (PMI)	ACSI	
5.5	Inspect plastic tubing in for signs of browning and replace as required.	Annually (PMI)	ACSI	
5.6	Wipe down ISIS cage and ion source lens insulators.	Annually (PMI)	ACSI	

TARGETRY				
Item	Routine description	Frequency	Responsibility	Signoff / date
8.1	Replace diaphragms on both Helium pumps *: frequency depends on usage.	Quarterly*	Customer	
8.2	Rebuild target (exchange foils and seals) *: frequency depends on usage.	Quarterly*	Customer	
8.3	Replace Transfer lines from target to switchyard (or MPV), and from syringe panel to switchyard (or MPV).	Annually (PMI)	Customer	
8.4	Replace Water and He cooling lines from Targets and baffles to Water manifold.	Annually (PMI)	ACSI*	
8.5	Replace braided silicone hoses in Helium cooling system.	Annually (PMI)	ACSI*	

Annual PM can be performed by adequately trained, and approved by ACSI, customer's cyclotron engineer

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SERVICES				
Item	Routine description	Frequency	Responsibility	Signoff / date
7.1	Perform water system monitoring checks, according to procedure described in the supplied documentation. Visually inspect for water leaks.	Weekly (PMI)	Customer	
7.2	Record the air pressure at the manifold for the following situations: RF Air Open:_____ psi RF Pressure: _____ psi RF Air Closed: _____psi and check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.3	Record the following values related to the Water Cooling System: Temperature:_____ °C. Resistivity:_____ MΩ.cm Water Manifold: Supply Pressure: _____psi. Return Pressure: _____ psi Check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.4	Record values indicated by each water flow meter in the manifold and compare it to the specified value in the supplied documentation. Refer to Appendix C.	Monthly (PMI)	Customer	
7.5	Change cartridges in 5µ filter units. *: frequency depends on the water quality and amount of water added to the system.	Semi-annually (PMI)	Customer	
7.6	Recharge or exchange the deionizing columns. *: Annually if local water quality is normal. Semi-annually if local water is “hard”	Semi-annually* (PMI)	Customer	
7.7	Check electrical panel door for sealing integrity.	Annually (PMI)	ACSI	
7.8	Check electrical connections in electrical panel; ensure no connections have loosened due to vibration.	Annually (PMI)	ACSI	
7.9	Reduce the flow for each flow meter in the manifold and confirm that the switch is tripped at or slightly above the specified trip point.	Annually (PMI)	ACSI	
7.10	Read and record temperature change across secondary of heat exchanger; read and record flow rate through heat exchanger; calculate and record heat extracted from secondary cooling water.	Annually (PMI)	ACSI	
7.11	Increase Water Package pressure and confirm that pressure stabilizes around the value specified in the pressure relief valve.	Annually (PMI)	ACSI	
7.12	Modify the water temperature set point to 4°C above the currently specified value. Confirm that 3 way mixing valve moves to respond to the new set point. Repeat for 2°C below the currently specified value.	Annually (PMI)	ACSI	
7.13	Check pressure levels and compare to the specified values in the supplied documentation. If necessary, readjust the corresponding globe valves.	Annually (PMI)	ACSI	

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4. Recommendations / Comments

The signoffs, recommendation(s) and comment(s) provided in this document represent the work performed during the Preventive Maintenance Visit.

Date: _____

ACSI REPRESENTATIVE (Name and signature)

Date: _____

CUSTOMER REPRESENTATIVE (Name and signature)

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Appendix A: RF System Information

Description		System **Without** Beam ☐ Not Applicable	System **With** Beam ☐ Not Applicable	Comments
Coupler Position	Set			
	Readback			
Tuner Position	Set			
	Readback			
Vacuum Level IG01				
P_{FWD} (scale)		kW	kW	
P_{REF} (scale)		kW	kW	
HVPS	U_a	kV	V	
	I_a	A	A	
Plate	Voltage	kV	V	
	Current	mA	mA	
Grid	U_g	V	V	
	I_g	mA	mA	
Screen	U_s	V	V	
	I_s	mA	mA	
Driver	P_{FWD}	W	W	
	P_{REF}	W	W	
Filament U_f		V	V	
Filament Life		hours	hours	
Synthesizer Level		MHz dBm	MHz dBm	
LED status		All ON :	All ON :	
Ctrl Local/Remote				

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RF Default Values	☐ Not Applicable
Punch Voltage	kV
Conditioning Voltage	kV
Operating Voltage	kV
Phase	
Tuner Cold Position	
Tuner Start Position	
Coupler Position	

RF Services	☐ Not Applicable
Water Supply	psi
Water Return	psi
Tuner Air Flow	lpm
Coupler Air Flow	lpm
Output loading	
Input Loading	
Input Matching	

Appendix B: ISIS and MM System Information

ISIS	☐ Not Applicable
Resistor 1 (100 Ω)	Ω
Resistor 2 (1 KΩ)	KΩ
Resistor 4 (50 MΩ)	MΩ
Bias Resistor (4.7 or 5.0 KΩ)	KΩ
CP & CCP	**☐ Not Applicable**
Static Pressure	psi
Operational Pressure	psi
CP01 Temperature	K
CP02 Temperature	K

MM Information	☐ Not Applicable
Output Voltage	
Transistor Voltage	
Output Current	
Primary Voltage	
Set / Readback Current	/ A
Secondary Voltage	
Proteus Frequency	

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Appendix C: Water System

Label	Description	Flow (l/min)	Ref. Flow (l/min)	Comments
Cyclotron Water Manifold				☐ Not Applicable
TG S1	Target Side 1			
TG S2	Target Side 2			
ISIS 1				
ISIS 2				
ISIS 2				
ISIS 3				
ISIS 4				
ISIS 5				
MMCU+MMCL	MM Coil Upper + Lower			
RF 1	RF Fixed (lower)			
RF 2	RF Moveable (upper)			
	TOTAL			
Cabinet Water Manifold				☐ Not Applicable
CCP / TP	Cryo-compressor + Turbo Pumps			
MMPS	Main Magnet Power Supply			
	RF Amplifier			
	RF Dummy Load (125kW)			
	TOTAL			

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10;11 nr.

Aptarnavimo planas ir TR-19 ciklotrono priežiūra

Šis dokumentas yra paslaugų plano, kurį ACSI siūlo apsvarstyti kaip dalį į pasiūlymą pateikiamo atsakymo, apžvalga. Išsami informacija ir sąlygos bus apibrėžtos galutinėje paslaugų teikimo sutartyje. Be to, atsižvelgiant į konkrečius kliento poreikius, gali būti parengtas individualus planas.

Papildoma informacija apie ACSI ciklotronų aptarnavimą pateikiama toliau nurodytuose dokumentuose:

- ACSI negarantinių paslaugų įkainiai 2020 metams.
- Ciklotrono vartojimo prekių ir atsarginių dalių kainoraštis.
- Profilaktinės techninės priežiūros kontrolinis sąrašas.

Siūlomas aptarnavimo planas ir išplėstinės garantijos galimybės

Subalansuotas aptarnavimo planas su 24/7 nuotoline prieiga prie techninės pagalbos iš ACSI komandos pusės, viena prevencinė ir viena avarinės tarnybos kelionė bei 10 % nuolaida dalims ir papildomoms paslaugoms. Be to, pagal šį paslaugų planą klientas gaus 10 % nuolaidą sistemos atnaujinimams, kurie gali būti prieinami paslaugų sutarties galiojimo metu.

Aptarnavimo planas ir išplėstinės garantijos privalumai yra apibendrinti toliau pateiktoje lentelėje

Privalumai	Paslaugų planas
Nuotolinis techninis palaikymas (9–17 val. Ramiojo vandenyno regiono laiku)	įtraukta
Nuotolinis techninis palaikymas (24/7)	įtraukta
Nuolaida dalims ir papildomoms paslaugoms	10 %
Nuolaida atnaujinimams	10 %
Profilaktiniai aptarnavimo vizitai per metus	1
Skubios pagalbos aptarnavimo vizitai per metus (gali būti derinami su profilaktiniais aptarnavimo vizitais)	1
Kaina per metus, eurais	XXXX

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Apibrėžimai:

Nuotolinis techninis palaikymas ir diagnostika telefonu ir nuotoliniu ryšiu

Operatorius galės atsakyti į klientų aptarnavimo telefono skambučius 24 valandas per parą, 7 dienas per savaitę. Budintis ACSI specialistas bus nedelsiant informuotas ir atsakys į užklausas. Sistemos stebėjimas realiuoju laiku yra prieinamas nuotoliniu ryšiu darbo valandomis arba susitarus.

Nuolaida dalims ir aptarnavimui

Bet kokiam dalių ar darbų pirkimui iš ACSI bus taikoma nuolaida iš ACSI sąrašo kainos pirkimo metu (arba konkreti kaina, kuriai bus taikoma nuolaida).

Reguliarios prevencinės priežiūros / mokymų kelionės

Reguliarios kelionės bus suplanuotos ir įtrauktos į kliento gamybos tvarkaraštį. Bus atlikta profilaktinė apžiūra ir išsami techninė priežiūra, kuri, ACSI nuomone, bus tinkama. Vienas ACSI specialistas bus išsiųstas numatytam vizitui, kurio trukmė – iki penkių dienų darbo vietoje. Klientas taip pat gali pasinaudoti šiais vizitais, paprašydamas ACSI specialisto surengti mokymus.

Avarinio aptarnavimo kelionės

ACSI specialistas bus išsiųstas, kai tik bus nustatyta, kad tai yra tinkamas veiksmų planas. Atvykimas į vietą numatomas per 48 valandas, atsižvelgiant į skrydžių tvarkaraščius, kuriuos galite peržiūrėti rezervavimo metu. ACSI supranta lemiamą tokio pobūdžio kelionių pobūdį ir padarys viską, kas įmanoma, kad atvyktų kaip įmanoma greičiau.

Kiekvieno vizito vietoje trukmė yra iki keturių darbo dienų, atsižvelgiant į atliekamas užduotis.

Negarantinių aptarnavimo darbų įkainis (2020 metai)

Toliau aprašomi įkainiai, kuriuos „Advanced Cyclotron Systems“ (ACSI) taikys aptarnavimo darbams, kurie buvo atlikti ne pagal oficialų susitarimą (garantija, išplėstinė garantija, aptarnavimo sutartis ir kt.). Už toliau aprašytas palaikymo paslaugas klientas turi nedelsdamas sumokėti šias sumas.

Techninė pagalba

Techninė pagalba teikiama darbo valandomis (9.0 –17.00 val. Ramiojo vandenyno regiono laiku). Pagalba ne darbo dienomis teikiama tik naudojantis 24/7 paslaugų planu. Kainos nurodytos Kanados doleriais.

TARIFO KODAS	TARIFAS (2 pastaba)	APRAŠYMAS
DARBO VIETOJE REG. DIENA	3 600 €	8 valandų diena; atokiau nuo ACSI biuro
1 VIRŠVALANDŽIŲ VALANDA DARBO VIETOJE	500 €	1 valandos viršvalandžiai; atokiau nuo ACSI biuro
DARBO KELIONĖS DIENA	2,500 €	8 valandų kelionės diena; maksimali norma; vertinama už mažiau
DARBO BIURE REG. VALANDA	300 €	1 valanda ACSI biure (9.00–17.00 PT)

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Darbas vietoje

Be pirmiau nurodytų mokesčių, klientas taip pat sumoka už būtinus skrydžius, jei to reikalaujama, kartu su pagrįstomis nakvynės ir vietinėmis pervežimo paslaugomis. ACSI dės visas pastangas, kad organizuotų keliones pagal kliento reikalavimus.

Accounting.

Išsamią sąskaitą faktūrą parengs ACSI, kai darbai bus atlikti. ACSI atstovas informuos klientą apie numatomą darbą, už kurį bus imami mokesčiai.

Pakartotinis nustatymas

Kainos pateikiamos tik nuorodoms. ACSI pasilieka teisę tikslinti kainas nuo 2021 m.

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TR-19 Preventative Maintenance

1. Routine Maintenance Overview

The ACSI TR-series cyclotrons are designed to provide the optimal combination of performance, reliability and serviceability. As with any high performance system, its reliability is a direct result of system operation under the specified parameters and procedures, and the adoption of an effective Preventive Maintenance (PM) program. That includes the weekly, monthly, quarterly, semi-annual and annual activities described below.

The PM program aims to delay the onset of quality degradation, or failure, due to drift of settings, wear & tear, oxidation, consumption, contact loosening due to vibration or cyclic temperature or pressure changes, aging, radiation, dust, etc.

The Preventive Maintenance performed on a regular basis is considered part of the operation of the production system, and therefore are to be performed by the Customer. The required knowledge to perform these activities is provided during the operation training. Depending on the module involved, these activities shall be scheduled on a weekly, monthly, quarterly or semi-annual basis, as specified in the following tables.

PM Event	Duration	Responsible person
Weekly	1 hour	First Line (customer)
Monthly	3-4 hours	First Line (customer)
Quarterly	1 day	First Line (customer)
Semi-Annual	1 day	First Line (customer)
Annual	3 to 5 days	Second Line (ACSI staff or ACSI approved)

The maintenance can be distributed along the specified periods or be scheduled to overlap with, for example, the weekly, monthly, quarterly and semi-annual routines being performed in the same day. The activities can be performed all at once, or be distributed along the applicable period, so the Operator can use the time available in between production runs to complete them.

Depending on personnel availability and how the production schedule is implemented, it is possible to combine several maintenance routines into a single session (filament exchange, foil exchange, target rebuild, etc.), so the regular routines have minimal impact in the production schedule.

2. Annual Preventive Maintenance (PM) Overview

The annual PM involves an extensive inspection of the system, including access to the main tank. In addition to repeating a number of regular routines (indicated by PM under brackets), specific advanced routines are also performed to ensure an extensive analysis of the system. As a result, the PM is expected to last from 3 to 5 working days. During these times, major planned refurbishments, replacements or some corrective maintenance can also occur.

The Annual Preventive maintenance is performed or supervised by an experienced Cyclotron Specialist, qualified as 2nd line of service or above. This type of maintenance is typically performed by ACSI specialist or experienced customer cyclotron engineer, adequately trained and approved by ACSI.

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3. Preventive Maintenance Routines and Checklist

For the TR-19 system, the Preventive Maintenance routines are divided into the following areas:

- RF SYSTEM
- VACUUM SYSTEM
- MAIN MAGNET, CM & SM POWER SUPPLIES
- PROBES
- HIGH VOLTAGE CABINET (ISIS CABINET)
- ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)
- TARGETRY
- SERVICES

RF SYSTEM				
Item	Routine description	Frequency	Responsibility	Signoff / date
1.1	Read & record all meters. Refer to Appendix A.	Weekly (PMI)	Customer	
1.2	Perform visual checks and note any degradation in performance quality.	Weekly (PMI)	Customer	
1.3	Physically inspect cabinets with power off. First inspect ground rod. All surfaces should be dust free. Use a vacuum with discretion for inaccessible spots.	Weekly (PMI)	Customer	
1.4	Check for loose connections and tighten as required.	Monthly (PMI)	Customer	
1.5	Examine boards and components for signs of damage.	Monthly (PMI)	Customer	
1.6	Check transmitter's input, filament, grid, screen parts and connections. If needed, clean parts where dust has accumulated.	Quarterly (PMI)	Customer	
1.7	Dust amplifier cavity with Kim wipes and clean interior with methanol. Clean inner conductor, loop, grounding capacitor and kapton insulator foil.	Quarterly (PMI)	Customer	
1.8	Check air filters. Clean or replace, as needed.	Semi-annually (PMI)	Customer	
1.9	Visually inspect RF vacuum tube (Triode or Tetrode). Check the cables, contacts & filters of the driver & RF synthesizer.	Annually (PMI)	ACSI*	
1.10	Check ARF and CRF related interlocks	Annually (PMI)	ACSI*	

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VACUUM SYSTEM				
Item	Routine description	Frequency	Responsibility (Optional)	Signoff / date
2.1	Check oil level in rotary vane pumps (roughing and backing). If level is low, add oil as per procedure in manual. Ensure oil is not contaminated. If dark, dirty, or turbid, replace it as per procedure in manual.	Monthly (PMI)	Customer	
2.2	Check wire mesh dirt trap in the intake flange centering ring of rotary vane pumps. Clean if necessary.	Monthly (PMI)	Customer	
2.3	Check helium pressure in Cryo pump compressor according to the range specified in the compressor manual. If necessary, recharge helium as per procedure in manual.	Monthly (PMI)	Customer	
2.4	Clean the backing line: disassemble the backing line & push a ball of lint-free tissue soaked in acetone through the copper plumbing. Repeat 4 times. Dry line with heat.	Quarterly (PMI)	Customer	
2.5	Replace copper wool trap and clean all components between the trap and the roughing valves in an ultrasound bath with alkaline detergent.	Semi-annually (PMI)	Customer	
2.6	Regenerate cryopumps according to procedure in maintenance manual.	Semi-annually (PMI)	Customer	
2.7	Calibrate convectron gauges.	Annually (PMI)	ACSI*	
2.8	Replace absorbers in helium compressor.	Every 3 years	ACSI*	

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MAIN MAGNET, CM & SM POWER SUPPLIES				
Item	Routine description	Frequency	Responsibility	Signoff / date
6.1	Confirm that all blue beacons are lit when the Main Magnet is ON.	Quarterly (PMI)	Customer	
6.2	Inspect for any evidence of water leakage.	Semi-annually (PMI)	Customer	
6.3	Ensure fan is working; listen for any obvious sound indicating bearing wear.	Semi-annually (PMI)	Customer	
6.4	Under operating load, touch transformer and choke to ensure they are not excessively hot.	Annually (PMI)	ACSI	
6.5	Measure and record input 3 phase AC voltages and line currents. L1-L2:_____ Vac _____ A L2-L3:_____ Vac _____ A L3-L1:_____ Vac _____ A Compare with previous year's values.	Annually (PMI)	ACSI	
6.6	Measure voltage at PS output and then at the load. Use the current value presented at the control system to calculate the cable + connection resistivity. Check connections if result is above the specified value.	Annually (PMI)	ACSI*	
6.7	Check cooling water flow and compare with the specified value. If a flow lower than 20% is observed, readjust water flow to restore previous value.	Annually (PMI)	ACSI*	
6.8	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - Emergency stop button - Water interlocks - Cabinet door interlocks	Annually (PMI)	ACSI*	
6.9	Check high-current dc connections to ensure integrity of contact: Inspect for any signs of burning. Ensure that all bolts remain fixed.	Annually (PMI)	ACSI*	
6.10	Remove and clean air filters; vacuum interior to remove all dust and dirt; some areas may be blown with compressed air if caution is used.	Annually (PMI)	ACSI*	
6.11	Applicable for CMPS & SMPS only: Visually inspect current transducer for any signs of overheating; Ensure that terminal connections are properly fixed.	Annually (PMI)	ACSI*	

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EXTRACTION PROBES				
Item	Routine description	Frequency	Responsibility	Signoff / date
3.1	Replace carbon foil on extractor probes. Inspect foil holder for signs of wear of damage. Replace foil holder if necessary. *: frequency depends on usage.	Quarterly* (PMI)	Customer	
3.2	Wipe drive mechanisms and inspect for visual signs of wear or damage.	Annually (PMI)	Customer	
3.3	Confirm that probes can move through entire travel range for all axes.	Annually (PMI)	ACSI	

HIGH VOLTAGE CABINET (ISIS CABINET)				
Item	Routine description	Frequency	Responsibility	Signoff / date
4.1	Wipe down High Voltage (HV) cabinet, HV cabinet insulators and HV duct Insulators.	Monthly (PMI)	Customer	
4.2	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - High Voltage Cabinet OK - ISIS Cage - AC Power On - High Voltage Safety	Annually (PMI)	ACSI	
4.3	With all power off, visually inspect interior of cabinet in vicinity of high voltage components for any signs of sparking.	Annually (PMI)	ACSI	
4.4	Confirm that the cooling fan(s) are working; listen carefully to each fan for any obvious sound indicating bearing wear.	Annually (PMI)	ACSI	
4.5	Remove and clean air filters; vacuum interior of cabinet to remove all dirt and dust; wipe inside of doors (do not blow compressed air in this cabinet).	Annually (PMI)	ACSI	
4.6	Check all high current (DC) electrical connections to ensure integrity of contacts. Pay particular attention to the filament and arc power supplies.	Annually (PMI)	ACSI	
4.7	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	

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ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)				
Item	Routine description	Frequency	Responsibility	Signoff / date
5.1	Replace ion source filament whenever current reaches 110A *: frequency depends on usage.	Quarterly*	Customer	
5.2	At every second filament change, replace all items included in the standard filament kit. *: frequency depends on usage.	Semi-annually (PMI)	Customer	
5.3	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	
5.4	Inspect current-limiting resistors connected to plasma & extraction lens. Measure their resistance and compare to the specified values. If any appear burned, affected by radiation, or with a deviation of 10% of specified value, have it replaced.	Annually (PMI)	ACSI	
5.5	Inspect plastic tubing in for signs of browning and replace as required.	Annually (PMI)	ACSI	
5.6	Wipe down ISIS cage and ion source lens insulators.	Annually (PMI)	ACSI	

TARGETRY				
Item	Routine description	Frequency	Responsibility	Signoff / date
8.1	Replace diaphragms on both Helium pumps *: frequency depends on usage.	Quarterly*	Customer	
8.2	Rebuild target (exchange foils and seals) *: frequency depends on usage.	Quarterly*	Customer	
8.3	Replace Transfer lines from target to switchyard (or MPV), and from syringe panel to switchyard (or MPV).	Annually (PMI)	Customer	
8.4	Replace Water and He cooling lines from Targets and baffles to Water manifold.	Annually (PMI)	ACSI*	
8.5	Replace braided silicone hoses in Helium cooling system.	Annually (PMI)	ACSI*	

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SERVICES				
Item	Routine description	Frequency	Responsibility	Signoff / date
7.1	Perform water system monitoring checks, according to procedure described in the supplied documentation. Visually inspect for water leaks.	Weekly (PMI)	Customer	
7.2	Record the air pressure at the manifold for the following situations: RF Air Open:_____ psi RF Pressure: _____ psi RF Air Closed: _____psi and check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.3	Record the following values related to the Water Cooling System: Temperature:_____ °C. Resistivity:_____ MΩ.cm Water Manifold: Supply Pressure: _____psi. Return Pressure: _____ psi Check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.4	Record values indicated by each water flow meter in the manifold and compare it to the specified value in the supplied documentation. Refer to Appendix C.	Monthly (PMI)	Customer	
7.5	Change cartridges in 5µ filter units. *: frequency depends on the water quality and amount of water added to the system.	Semi-annually (PMI)	Customer	
7.6	Recharge or exchange the deionizing columns. *: Annually if local water quality is normal. Semi-annually if local water is “hard”	Semi-annually* (PMI)	Customer	
7.7	Check electrical panel door for sealing integrity.	Annually (PMI)	ACSI	
7.8	Check electrical connections in electrical panel; ensure no connections have loosened due to vibration.	Annually (PMI)	ACSI	
7.9	Reduce the flow for each flow meter in the manifold and confirm that the switch is tripped at or slightly above the specified trip point.	Annually (PMI)	ACSI	
7.10	Read and record temperature change across secondary of heat exchanger; read and record flow rate through heat exchanger; calculate and record heat extracted from secondary cooling water.	Annually (PMI)	ACSI	
7.11	Increase Water Package pressure and confirm that pressure stabilizes around the value specified in the pressure relief valve.	Annually (PMI)	ACSI	
7.12	Modify the water temperature set point to 4°C above the currently specified value. Confirm that 3 way mixing valve moves to respond to the new set point. Repeat for 2°C below the currently specified value.	Annually (PMI)	ACSI	
7.13	Check pressure levels and compare to the specified values in the supplied documentation. If necessary, readjust the corresponding globe valves.	Annually (PMI)	ACSI	

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4. Recommendations / Comments

The signoffs, recommendation(s) and comment(s) provided in this document represent the work performed during the Preventive Maintenance Visit.

Date: _____

ACSI REPRESENTATIVE (Name and signature)

Date: _____

CUSTOMER REPRESENTATIVE (Name and signature)

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Appendix A: RF System Information

Description		System **Without** Beam ☐ Not Applicable	System **With** Beam ☐ Not Applicable	Comments
Coupler Position	Set			
	Readback			
Tuner Position	Set			
	Readback			
Vacuum Level IG01				
P_{FWD} (scale)		kW	kW	
P_{REF} (scale)		kW	kW	
HVPS	U_a	kV	V	
	I_a	A	A	
Plate	Voltage	kV	V	
	Current	mA	mA	
Grid	U_g	V	V	
	I_g	mA	mA	
Screen	U_s	V	V	
	I_s	mA	mA	
Driver	P_{FWD}	W	W	
	P_{REF}	W	W	
Filament U_f		V	V	
Filament Life		hours	hours	
Synthesizer Level		MHz dBm	MHz dBm	
LED status		All ON :	All ON :	
Ctrl Local/Remote				

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RF Default Values	☐ Not Applicable
Punch Voltage	kV
Conditioning Voltage	kV
Operating Voltage	kV
Phase	
Tuner Cold Position	
Tuner Start Position	
Coupler Position	

RF Services	☐ Not Applicable
Water Supply	psi
Water Return	psi
Tuner Air Flow	lpm
Coupler Air Flow	lpm
Output loading	
Input Loading	
Input Matching	

Appendix B: ISIS and MM System Information

ISIS	☐ Not Applicable
Resistor 1 (100 Ω)	Ω
Resistor 2 (1 KΩ)	KΩ
Resistor 4 (50 MΩ)	MΩ
Bias Resistor (4.7 or 5.0 KΩ)	KΩ
CP & CCP	**☐ Not Applicable**
Static Pressure	psi
Operational Pressure	psi
CP01 Temperature	K
CP02 Temperature	K

MM Information	☐ Not Applicable
Output Voltage	
Transistor Voltage	
Output Current	
Primary Voltage	
Set / Readback Current	/ A
Secondary Voltage	
Proteus Frequency	

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Appendix C: Water System

Label	Description	Flow (l/min)	Ref. Flow (l/min)	Comments
Cyclotron Water Manifold				☐ Not Applicable
TG S1	Target Side 1			
TG S2	Target Side 2			
ISIS 1				
ISIS 2				
ISIS 2				
ISIS 3				
ISIS 4				
ISIS 5				
MMCU+MMCL	MM Coil Upper + Lower			
RF 1	RF Fixed (lower)			
RF 2	RF Moveable (upper)			
	TOTAL			
Cabinet Water Manifold				☐ Not Applicable
CCP / TP	Cryo-compressor + Turbo Pumps			
MMPS	Main Magnet Power Supply			
	RF Amplifier			
	RF Dummy Load (125kW)			
	TOTAL			

Vertimas atliktas vertimų biure „AIRV“, į. k. 134819573, Raugyklos g. 4ª / Šv. Stepono g. 7, Vilnius.
Vertimo tikrumą ir atitiktį originaliam tekstui liudiju.
.

Vertėja
Translator / Переводчик
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10;11 nr.

TR-19 Preventative Maintenance

1. Routine Maintenance Overview

The ACSI TR-series cyclotrons are designed to provide the optimal combination of performance, reliability and serviceability. As with any high performance system, its reliability is a direct result of system operation under the specified parameters and procedures, and the adoption of an effective Preventive Maintenance (PM) program. That includes the weekly, monthly, quarterly, semi-annual and annual activities described below.

The PM program aims to delay the onset of quality degradation, or failure, due to drift of settings, wear & tear, oxidation, consumption, contact loosening due to vibration or cyclic temperature or pressure changes, aging, radiation, dust, etc.

The Preventive Maintenance performed on a regular basis is considered part of the operation of the production system, and therefore are to be performed by the Customer. The required knowledge to perform these activities is provided during the operation training. Depending on the module involved, these activities shall be scheduled on a weekly, monthly, quarterly or semi-annual basis, as specified in the following tables.

PM Event	Duration	Responsible person
Weekly	1 hour	First Line (customer)
Monthly	3-4 hours	First Line (customer)
Quarterly	1 day	First Line (customer)
Semi-Annual	1 day	First Line (customer)
Annual	3 to 5 days	Second Line (ACSI staff or ACSI approved)

The maintenance can be distributed along the specified periods or be scheduled to overlap with, for example, the weekly, monthly, quarterly and semi-annual routines being performed in the same day. The activities can be performed all at once, or be distributed along the applicable period, so the Operator can use the time available in between production runs to complete them.

Depending on personnel availability and how the production schedule is implemented, it is possible to combine several maintenance routines into a single session (filament exchange, foil exchange, target rebuild, etc.), so the regular routines have minimal impact in the production schedule.

2. Annual Preventive Maintenance (PM) Overview

The annual PM involves an extensive inspection of the system, including access to the main tank. In addition to repeating a number of regular routines (indicated by PM under brackets), specific advanced routines are also performed to ensure an extensive analysis of the system. As a result, the PM is expected to last from 3 to 5 working days. During these times, major planned refurbishments, replacements or some corrective maintenance can also occur.

The Annual Preventive maintenance is performed or supervised by an experienced Cyclotron Specialist, qualified as 2nd line of service or above. This type of maintenance is typically performed by ACSI specialist or experienced customer cyclotron engineer, adequately trained and approved by ACSI.

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3. Preventive Maintenance Routines and Checklist

For the TR-19 system, the Preventive Maintenance routines are divided into the following areas:

- RF SYSTEM
- VACUUM SYSTEM
- MAIN MAGNET, CM & SM POWER SUPPLIES
- PROBES
- HIGH VOLTAGE CABINET (ISIS CABINET)
- ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)
- TARGETRY
- SERVICES

RF SYSTEM				
Item	Routine description	Frequency	Responsibility	Signoff / date
1.1	Read & record all meters. Refer to Appendix A.	Weekly (PMI)	Customer	
1.2	Perform visual checks and note any degradation in performance quality.	Weekly (PMI)	Customer	
1.3	Physically inspect cabinets with power off. First inspect ground rod. All surfaces should be dust free. Use a vacuum with discretion for inaccessible spots.	Weekly (PMI)	Customer	
1.4	Check for loose connections and tighten as required.	Monthly (PMI)	Customer	
1.5	Examine boards and components for signs of damage.	Monthly (PMI)	Customer	
1.6	Check transmitter's input, filament, grid, screen parts and connections. If needed, clean parts where dust has accumulated.	Quarterly (PMI)	Customer	
1.7	Dust amplifier cavity with Kim wipes and clean interior with methanol. Clean inner conductor, loop, grounding capacitor and kapton insulator foil.	Quarterly (PMI)	Customer	
1.8	Check air filters. Clean or replace, as needed.	Semi-annually (PMI)	Customer	
1.9	Visually inspect RF vacuum tube (Triode or Tetrode). Check the cables, contacts & filters of the driver & RF synthesizer.	Annually (PMI)	ACSI*	
1.10	Check ARF and CRF related interlocks	Annually (PMI)	ACSI*	

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VACUUM SYSTEM				
Item	Routine description	Frequency	Responsibility (Optional)	Signoff / date
2.1	Check oil level in rotary vane pumps (roughing and backing). If level is low, add oil as per procedure in manual. Ensure oil is not contaminated. If dark, dirty, or turbid, replace it as per procedure in manual.	Monthly (PMI)	Customer	
2.2	Check wire mesh dirt trap in the intake flange centering ring of rotary vane pumps. Clean if necessary.	Monthly (PMI)	Customer	
2.3	Check helium pressure in Cryo pump compressor according to the range specified in the compressor manual. If necessary, recharge helium as per procedure in manual.	Monthly (PMI)	Customer	
2.4	Clean the backing line: disassemble the backing line & push a ball of lint-free tissue soaked in acetone through the copper plumbing. Repeat 4 times. Dry line with heat.	Quarterly (PMI)	Customer	
2.5	Replace copper wool trap and clean all components between the trap and the roughing valves in an ultrasound bath with alkaline detergent.	Semi-annually (PMI)	Customer	
2.6	Regenerate cryopumps according to procedure in maintenance manual.	Semi-annually (PMI)	Customer	
2.7	Calibrate convectron gauges.	Annually (PMI)	ACSI*	
2.8	Replace absorbers in helium compressor.	Every 3 years	ACSI*	

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MAIN MAGNET, CM & SM POWER SUPPLIES				
Item	Routine description	Frequency	Responsibility	Signoff / date
6.1	Confirm that all blue beacons are lit when the Main Magnet is ON.	Quarterly (PMI)	Customer	
6.2	Inspect for any evidence of water leakage.	Semi-annually (PMI)	Customer	
6.3	Ensure fan is working; listen for any obvious sound indicating bearing wear.	Semi-annually (PMI)	Customer	
6.4	Under operating load, touch transformer and choke to ensure they are not excessively hot.	Annually (PMI)	ACSI	
6.5	Measure and record input 3 phase AC voltages and line currents. L1-L2:_____ Vac _____ A L2-L3:_____ Vac _____ A L3-L1:_____ Vac _____ A Compare with previous year's values.	Annually (PMI)	ACSI	
6.6	Measure voltage at PS output and then at the load. Use the current value presented at the control system to calculate the cable + connection resistivity. Check connections if result is above the specified value.	Annually (PMI)	ACSI*	
6.7	Check cooling water flow and compare with the specified value. If a flow lower than 20% is observed, readjust water flow to restore previous value.	Annually (PMI)	ACSI*	
6.8	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - Emergency stop button - Water interlocks - Cabinet door interlocks	Annually (PMI)	ACSI*	
6.9	Check high-current dc connections to ensure integrity of contact: Inspect for any signs of burning. Ensure that all bolts remain fixed.	Annually (PMI)	ACSI*	
6.10	Remove and clean air filters; vacuum interior to remove all dust and dirt; some areas may be blown with compressed air if caution is used.	Annually (PMI)	ACSI*	
6.11	Applicable for CMPS & SMPS only: Visually inspect current transducer for any signs of overheating; Ensure that terminal connections are properly fixed.	Annually (PMI)	ACSI*	

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EXTRACTION PROBES				
Item	Routine description	Frequency	Responsibility	Signoff / date
3.1	Replace carbon foil on extractor probes. Inspect foil holder for signs of wear of damage. Replace foil holder if necessary. *: frequency depends on usage.	Quarterly* (PMI)	Customer	
3.2	Wipe drive mechanisms and inspect for visual signs of wear or damage.	Annually (PMI)	Customer	
3.3	Confirm that probes can move through entire travel range for all axes.	Annually (PMI)	ACSI	

HIGH VOLTAGE CABINET (ISIS CABINET)				
Item	Routine description	Frequency	Responsibility	Signoff / date
4.1	Wipe down High Voltage (HV) cabinet, HV cabinet insulators and HV duct Insulators.	Monthly (PMI)	Customer	
4.2	With the main magnet and ISIS turned OFF, check that the following interlocks are working: - High Voltage Cabinet OK - ISIS Cage - AC Power On - High Voltage Safety	Annually (PMI)	ACSI	
4.3	With all power off, visually inspect interior of cabinet in vicinity of high voltage components for any signs of sparking.	Annually (PMI)	ACSI	
4.4	Confirm that the cooling fan(s) are working; listen carefully to each fan for any obvious sound indicating bearing wear.	Annually (PMI)	ACSI	
4.5	Remove and clean air filters; vacuum interior of cabinet to remove all dirt and dust; wipe inside of doors (do not blow compressed air in this cabinet).	Annually (PMI)	ACSI	
4.6	Check all high current (DC) electrical connections to ensure integrity of contacts. Pay particular attention to the filament and arc power supplies.	Annually (PMI)	ACSI	
4.7	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	

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ION SOURCE AND INJECTION SYSTEM (ISIS CAGE)				
Item	Routine description	Frequency	Responsibility	Signoff / date
5.1	Replace ion source filament whenever current reaches 110A *: frequency depends on usage.	Quarterly*	Customer	
5.2	At every second filament change, replace all items included in the standard filament kit. *: frequency depends on usage.	Semi-annually (PMI)	Customer	
5.3	Inspect all connections to the ion source load; tighten as necessary.	Annually (PMI)	ACSI	
5.4	Inspect current-limiting resistors connected to plasma & extraction lens. Measure their resistance and compare to the specified values. If any appear burned, affected by radiation, or with a deviation of 10% of specified value, have it replaced.	Annually (PMI)	ACSI	
5.5	Inspect plastic tubing in for signs of browning and replace as required.	Annually (PMI)	ACSI	
5.6	Wipe down ISIS cage and ion source lens insulators.	Annually (PMI)	ACSI	

TARGETRY				
Item	Routine description	Frequency	Responsibility	Signoff / date
8.1	Replace diaphragms on both Helium pumps *: frequency depends on usage.	Quarterly*	Customer	
8.2	Rebuild target (exchange foils and seals) *: frequency depends on usage.	Quarterly*	Customer	
8.3	Replace Transfer lines from target to switchyard (or MPV), and from syringe panel to switchyard (or MPV).	Annually (PMI)	Customer	
8.4	Replace Water and He cooling lines from Targets and baffles to Water manifold.	Annually (PMI)	ACSI*	
8.5	Replace braided silicone hoses in Helium cooling system.	Annually (PMI)	ACSI*	

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SERVICES				
Item	Routine description	Frequency	Responsibility	Signoff / date
7.1	Perform water system monitoring checks, according to procedure described in the supplied documentation. Visually inspect for water leaks.	Weekly (PMI)	Customer	
7.2	Record the air pressure at the manifold for the following situations: RF Air Open:_____ psi RF Pressure: _____ psi RF Air Closed: _____psi and check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.3	Record the following values related to the Water Cooling System: Temperature:_____ °C. Resistivity:_____ MΩ.cm Water Manifold: Supply Pressure: _____psi. Return Pressure: _____ psi Check if they match the values specified in the supplied documentation.	Monthly (PMI)	Customer	
7.4	Record values indicated by each water flow meter in the manifold and compare it to the specified value in the supplied documentation. Refer to Appendix C.	Monthly (PMI)	Customer	
7.5	Change cartridges in 5µ filter units. *: frequency depends on the water quality and amount of water added to the system.	Semi-annually (PMI)	Customer	
7.6	Recharge or exchange the deionizing columns. *: Annually if local water quality is normal. Semi-annually if local water is "hard"	Semi-annually* (PMI)	Customer	
7.7	Check electrical panel door for sealing integrity.	Annually (PMI)	ACSI	
7.8	Check electrical connections in electrical panel; ensure no connections have loosened due to vibration.	Annually (PMI)	ACSI	
7.9	Reduce the flow for each flow meter in the manifold and confirm that the switch is tripped at or slightly above the specified trip point.	Annually (PMI)	ACSI	
7.10	Read and record temperature change across secondary of heat exchanger; read and record flow rate through heat exchanger; calculate and record heat extracted from secondary cooling water.	Annually (PMI)	ACSI	
7.11	Increase Water Package pressure and confirm that pressure stabilizes around the value specified in the pressure relief valve.	Annually (PMI)	ACSI	
7.12	Modify the water temperature set point to 4°C above the currently specified value. Confirm that 3 way mixing valve moves to respond to the new set point. Repeat for 2°C below the currently specified value.	Annually (PMI)	ACSI	
7.13	Check pressure levels and compare to the specified values in the supplied documentation. If necessary, readjust the corresponding globe valves.	Annually (PMI)	ACSI	

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4. Recommendations / Comments

The signoffs, recommendation(s) and comment(s) provided in this document represent the work performed during the Preventive Maintenance Visit.

Date: _____

ACSI REPRESENTATIVE (Name and signature)

_____

Date: _____

CUSTOMER REPRESENTATIVE (Name and signature)

_____

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Appendix A: RF System Information

Description		System **Without** Beam ☐ Not Applicable	System **With** Beam ☐ Not Applicable	Comments
Coupler Position	Set			
	Readback			
Tuner Position	Set			
	Readback			
Vacuum Level IG01				
P_{FWD} (scale)		kW	kW	
P_{REF} (scale)		kW	kW	
HVPS	U_a	kV	V	
	I_a	A	A	
Plate	Voltage	kV	V	
	Current	mA	mA	
Grid	U_g	V	V	
	I_g	mA	mA	
Screen	U_s	V	V	
	I_s	mA	mA	
Driver	P_{FWD}	W	W	
	P_{REF}	W	W	
Filament U_f		V	V	
Filament Life		hours	hours	
Synthesizer Level		MHz dBm	MHz dBm	
LED status		All ON :	All ON :	
Ctrl Local/Remote				

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RF Default Values	☐ Not Applicable
Punch Voltage	kV
Conditioning Voltage	kV
Operating Voltage	kV
Phase	
Tuner Cold Position	
Tuner Start Position	
Coupler Position	

RF Services	☐ Not Applicable
Water Supply	psi
Water Return	psi
Tuner Air Flow	lpm
Coupler Air Flow	lpm
Output loading	
Input Loading	
Input Matching	

Appendix B: ISIS and MM System Information

ISIS	☐ Not Applicable
Resistor 1 (100 Ω)	Ω
Resistor 2 (1 KΩ)	KΩ
Resistor 4 (50 MΩ)	MΩ
Bias Resistor (4.7 or 5.0 KΩ)	KΩ
CP & CCP	**☐ Not Applicable**
Static Pressure	psi
Operational Pressure	psi
CP01 Temperature	K
CP02 Temperature	K

MM Information	☐ Not Applicable
Output Voltage	
Transistor Voltage	
Output Current	
Primary Voltage	
Set / Readback Current	/ A
Secondary Voltage	
Proteus Frequency	

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Appendix C: Water System

Label	Description	Flow (l/min)	Ref. Flow (l/min)	Comments
Cyclotron Water Manifold				☐ Not Applicable
TG S1	Target Side 1			
TG S2	Target Side 2			
ISIS 1				
ISIS 2				
ISIS 2				
ISIS 3				
ISIS 4				
ISIS 5				
MMCU+MMCL	MM Coil Upper + Lower			
RF 1	RF Fixed (lower)			
RF 2	RF Moveable (upper)			
	TOTAL			
Cabinet Water Manifold				☐ Not Applicable
CCP / TP	Cryo-compressor + Turbo Pumps			
MMPS	Main Magnet Power Supply			
	RF Amplifier			
	RF Dummy Load (125kW)			
	TOTAL			

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TR-19 Profilaktinė priežiūra

1. Įprastos priežiūros apžvalga

„ACSI“ TR serijos ciklotronai yra optimalus našumo, patikimumo ir tinkamumo naudoti derinys. Jų, kaip ir bet kurios didelio našumo sistemos, patikimumas tiesiogiai priklauso nuo sistemos eksploatavimo pagal nurodytus parametrus ir tvarkos aprašus bei parengto efektyvios profilaktinės priežiūros programos. Siekiant užtikrinti patikimumą, kas savaitę, mėnesį, ketvirtį, pusmetį ir metus atliekama toliau nurodyta veikla.

Profilaktinės priežiūros programa skirta kaip įmanoma ilgiau išvengti kokybės pablogėjimo ar gedimo dėl nuostatų nukrypimo, dėvėjimosi, oksidacijos, suvartojimo, dėl vibracijos, ciklinės temperatūros ar slėgio pokyčių atsilaisvinusių kontaktų, senėjimo, radiacijos, dulkių ir kitų veiksnių.

Reguliari profilaktinė priežiūra yra gamybos sistemos eksploatavimo dalis, todėl ją turi atlikti klientas. Žinios, reikalingos šiai veiklai atlikti, suteikiamos eksploatavimo mokymų metu. Priklausomai nuo naudojamo modulio, veikla planuojama kas savaitę, mėnesį, ketvirtį ar pusmetį, kaip nurodyta toliau pateiktose lentelėse.

Prof. priež. įvykis	Trukmė	Atsakingas asmuo
Kas savaitę	1 val.	Pirmoji linija (klientas)
Kas mėnesį	3–4 val.	Pirmoji linija (klientas)
Kas ketvirtį	1 d.	Pirmoji linija (klientas)
Kas pusmetį	1 d.	Pirmoji linija (klientas)
Kasmet	3–5 d.	Antroji linija („ACSI“ darbuotojai arba „ACSI“ patvirtinti asmenys)

Techninę priežiūrą galima paskirstyti nustatytais laikotarpiais arba planuoti, kad ji sutaptų, pavyzdžiui, su savaitės, mėnesio, ketvirčio ir pusmečio darbais, kurie bus atliekami tą pačią dieną. Darbai gali būti atliekami iš karto arba paskirstyti per tam tikrą laikotarpį, todėl operatorius gali juos užbaigti per pertraukas tarp gamybos ciklų.

Atsižvelgiant į darbuotojų prieinamumą ir į tai, kaip vykdomas gamybos grafikas, galima sujungti keletą priežiūros procedūrų į vieną (kaitinamųjų siūlų keitimas, folijos keitimas, tikslinės medžiagos rekonstrukcija ir kt.). Tokiu būdu įprastos priežiūros procedūros turės minimalų poveikį gamybos grafikui.

2. Metinės profilaktinės priežiūros apžvalga

Kasmetinė profilaktinė priežiūra apima išsamų sistemos patikrinimą, įskaitant prieigą prie pagrindinio rezervuaro. Be įvairių įprastų procedūrų (jos nurodytos skliausteliuose), taip pat atliekamos specialios pažangios procedūros, per kurias išsamiai analizuojama sistema. Numatoma, kad profilaktinė priežiūra truks nuo 3 iki 5 darbo dienų. Per šį laikotarpį taip pat gali būti įgyvendinti dideli planuojami remonto darbai, pakeitimai ar taisymai.

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Kasmetinę profilaktinę techninę priežiūrą atlieka arba ją prižiūri patyręs ciklotrono specialistas, kvalifikuotas teikti 2-os linijos paslaugas. Tokią techninę priežiūrą paprastai vykdo „ACSI“ specialistas arba patyręs klientų ciklotronų inžinierius, tinkamai apmokytas ir patvirtintas „ACSI“.

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3. Profilaktinės priežiūros procedūros ir kontrolinis sąrašas

TR-19 sistemos prevencinės priežiūros procedūros skirstomos į šias sritis:

- RADIJO DAŽNIŲ SISTEMA
- SIURBLIŲ SISTEMA
- PAGRINDINIS MAGNETAS, CM IR SM MAITINIMO ŠALTINIAI
- LIESTUKAI
- AUKŠTOS ĮTAMPOS SPINTA (ISIS SPINTA)
- JONŲ ŠALTINIO IR ĮPURŠKIMO SISTEMA (ISIS NARVAS)
- TAIKINIAI
- PASLAUGOS

RADIJO DAŽNIŲ SISTEMA				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasirašo / data
1.1	Nuskaityti ir įrašyti visus matuoklius. Žr. A priedą.	Kas savaitę (prof. pr.)	Klientas	
1.2	Vizualiai apžiūrėti ir pažymėti eksploatacinių savybių pablogėjimą.	Kas savaitę (prof. pr.)	Klientas	
1.3	Fiziškai patikrinti spintas, prieš tai išjungus maitinimą. Pirmiausia patikrinti įžeminimo strypą. Ant paviršių neturi būti dulkių. Nepasiekiamoms vietoms naudoti siurblį.	Kas savaitę (prof. pr.)	Klientas	
1.4	Patikrinti, ar nėra atsilaisvinusių jungčių, ir, jei reikia, priveržti.	Kas mėnesį (prof. pr.)	Klientas	
1.5	Patikrinti, ar nėra lentų ir komponentų pažeidimų.	Kas mėnesį (prof. pr.)	Klientas	
1.6	Patikrinti siųstuvo įvestį, kaitinamąjį siūlą, tinklelį, ekrano dalis ir jungtis. Jei reikia, nuvalykite dalis, kuriose susikaupė dulkių.	Kas ketvirtį (prof. pr.)	Klientas	
1.7	Naudojant „Kim“ servetėles išvalyti dulkes iš stiprintuvo ertmės, o vidų išvalyti metanoliu. Nuvalyti vidinį laidininką, grandinę, įžeminimo kondensatorių ir „Kapton“ izoliuojančią foliją.	Kas ketvirtį (prof. pr.)	Klientas	
1.8	Patikrinti oro filtrus. Jei reikia, išvalyti arba pakeisti.	Kas pusmetį (prof. pr.)	Klientas	
1.9	Vizualiai patikrinti radijo dažniais valdomo siurblio vamzdį (triodą arba tetrodą). Patikrinti tvarkyklės ir radijo bangų sintezatoriaus laidus, kontaktus ir filtrus.	Kasmet (prof. pr.)	„ACSI“*	

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1.10	Patikrinti su analoginiu ir įprastuoju radijo dažniais susijusias jungtis	Kasmet (prof. pr.)	„ACSI“*	

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SIURBLIŲ SISTEMA				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė (neprivaloma)	Pasirašo / data
2.1	Patikrinti alyvos lygį siurbliuose su mentėmis rotoriuje (siurbiant ir palaikant slėgį). Jei lygis žemas, įpilti alyvos, kaip nurodyta instrukcijoje. Užtikrinti, kad alyva neužteršta. Jei alyva tamsi, purvina ar drumsta, pakeisti ją pagal vadove pateiktą tvarkos aprašą.	Kas mėnesį (prof. pr.)	Klientas	
2.2	Patikrinti metalinio tinklelio purvo gaudyklę siurblių su mentėmis rotoriuje įsiurbimo jungės centravimo žiede. Jei reikia, išvalyti.	Kas mėnesį (prof. pr.)	Klientas	
2.3	Patikrinti kriogeninio siurblio kompresoriaus helio slėgį pagal diapazoną, nurodytą kompresoriaus vadove. Jei reikia, papildyti helį pagal tvarkos aprašą, pateiktą vadove.	Kas mėnesį (prof. pr.)	Klientas	
2.4	Išvalyti slėgio palaikymo liniją: išardyti ją ir per varinius vamzdžius prastumti acetone pamirkytą audinį be pūkelių. Pakartoti 4 kartus. Nusausinti liniją pučiant šilumą.	Kas ketvirtį (prof. pr.)	Klientas	
2.5	Pakeisti varinę vatos gaudyklę ir šarminiu plovikliu nuvalyti visus komponentus tarp gaudyklės ir siurbimo vožtuvų ultragarso vonioje.	Kas pusmetį (prof. pr.)	Klientas	
2.6	Regeneruoti kriogeninius siurblius pagal vadove nurodytą tvarkos aprašą.	Kas pusmetį (prof. pr.)	Klientas	
2.7	Sukalibruoti konvekroninius matuoklius.	Kasmet (prof. pr.)	„ACSI“*	
2.8	Pakeisti absorbentus helio kompresoriuje.	Kas 3 metus	„ACSI“*	

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PAGRINDINIS MAGNETAS, CM IR SM MAITINIMO ŠALTINIAI				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasirašo / data
6.1	Patikrinti, ar visi mėlyni švyturėliai užsidega įjungus pagrindinį magnetą.	Kas ketvirtį (prof. pr.)	Klientas	
6.2	Patikrinti, ar nėra vandens nutekėjimo požymių.	Kas pusmetį (prof. pr.)	Klientas	
6.3	Įsitikinti, kad ventiliatorius veikia; klausytis, ar nėra akivaizdaus garso, bylojančio apie susidėvėjimą	Kas pusmetį (prof. pr.)	Klientas	
6.4	Esant apkrovai, paliesti transformatorių ir droselį bei patikrinti, ar jie ne per karšti.	Kasmet (prof. pr.)	„ACSI“	
6.5	Išmatuoti ir užfiksuoti 3 fazių kintamosios srovės įtampas ir linijos sroves. L1–L2:_____ V kint. sr. _____ A L2–L3:_____ V kint. sr. _____ A L3–L1:_____ V kint. sr. _____ A Palyginti su praėjusių metų vertėmis.	Kasmet (prof. pr.)	„ACSI“	
6.6	Išmatuoti įtampą esant PS išėjimui, tada – apkrovai. Kabelio + jungties varžai apskaičiuoti naudoti valdymo sistemoje pateiktą einamąją vertę. Jei rezultatas viršija nurodytą vertę – patikrinti jungtis.	Kasmet (prof. pr.)	„ACSI“*	
6.7	Patikrinti aušinimo vandens srautą ir palyginti su nurodyta verte. Pastebėjus mažesnį nei 20 proc. srautą, sureguliuoti vandens srautą, kad būtų atkurta ankstesnė vertė.	Kasmet (prof. pr.)	„ACSI“*	
6.8	Kai pagrindinis magnetas ir ISIS išjungti, patikrinti, ar veikia šie blokatoriai: - Avarinio stabdymo mygtukas - Vandens blokatoriai - Spintos durelių blokatoriai	Kasmet (prof. pr.)	„ACSI“*	
6.9	Patikrinti didelės nuolatinės srovės jungtis ir užtikrinti, kad kontaktas nenutrūksta: Patikrinti, ar nėra degimo požymių. Užtikrinti, kad visi varžtai yra pritvirtinti.	Kasmet (prof. pr.)	„ACSI“*	
6.10	Išimti ir nuvalyti oro filtrus; išsiurbti dulkes ir nešvarumus iš vidaus; kai kurias sritis galima pūsti suspaustu oru, bet atsargiai.	Kasmet (prof. pr.)	„ACSI“*	
6.11	Taikoma tik CMPS ir SMPS: Vizualiai patikrinti, ar nėra keitiklio perkaitimo požymių; Užtikrinti, kad gnybtų jungtys yra tinkamai pritvirtintos.	Kasmet (prof. pr.)	„ACSI“*	

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IŠTRAUKIMO LIESTUKAI				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasiraš o / data
3.1	Pakeisti anglies foliją, kuri dengia ištraukimo liestukus. Patikrinti, ar folijos laikiklis nėra pažeistas. Jei reikia, pakeisti folijos laikiklį. *: dažnis priklauso nuo naudojimo.	Kas ketvirtį* (prof. pr.)	Klientas	
3.2	Nuvalyti pavaros mechanizmus ir patikrinti, ar nėra vizualių susidėvėjimo ar žalos požymių.	Kasmet (prof. pr.)	Klientas	
3.3	Patvirtinti, kad visų ašių liestukai gali judėti per visą eigos amplitudę.	Kasmet (prof. pr.)	„ACSI“	

AUKŠTOS ĮTAMPOS SPINTA (ISIS SPINTA)				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasiraš o / data
4.1	Nuvalyti aukštos įtampos spintą, jos izoliatorius ir ortakių izoliatorius.	Kas mėnesį (prof. pr.)	Klientas	
4.2	Kai pagrindinis magnetas ir ISIS išjungti, patikrinti, ar veikia šie blokatoriai: - Aukštos įtampos spinta - ISIS narvas - Kintamosios srovės maitinimas įjungtas - Aukštos įtampos sauga	Kasmet (prof. pr.)	„ACSI“	
4.3	Išjungus visą maitinimą, apžiūrėti spintos vidų šalia aukštos įtampos komponentų, ar nėra kibirkščiavimo požymių.	Kasmet (prof. pr.)	„ACSI“	
4.4	Patikrinti, ar veikia aušinimo ventiliatorius (-iai); atidžiai įsiklausyti į kiekvieną ventiliatorių, ar nesigirdi garsų, akivaizdžiai bylojančių apie nusidėvėjusius guolius.	Kasmet (prof. pr.)	„ACSI“	
4.5	Išimti ir nuvalyti oro filtrus; išvalyti nešvarumus ir dulkes iš spintos siurblio vidaus; nuvalyti durelių vidų (nepūsti suspausto oro spintoje).	Kasmet (prof. pr.)	„ACSI“	
4.6	Patikrinti visas didelės nuolatinės srovės elektros jungtis ir užtikrinti, kad kontaktas nenutrūksta: Ypatingą dėmesį skirti kaitinamajam siūlui ir lanko maitinimo šaltiniams.	Kasmet (prof. pr.)	„ACSI“	

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4.7	Patikrinti visas jungtis su jonų šaltinio apkrova; prireikus priveržti.	Kasmet (prof. pr.)	„ACSI“	

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JONŲ ŠALTINIO IR ĮPURŠKIMO SISTEMA (ISIS NARVAS)				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasiraš o / data
5.1	Pakeiskite jonų šaltinio siūlą, jei srovė pasiekia 110A *: dažnis priklauso nuo naudojimo.	Kas ketvirtį*	Klientas	
5.2	Kas antrą kartą keičiant kaitinimo siūlą, pakeisti visas į standartinį kaitinimo siūlų rinkinį įtrauktus elementus. *: dažnis priklauso nuo naudojimo.	Kas pusmetį (prof. pr.)	Klientas	
5.3	Patikrinti visas jungtis su jonų šaltinio apkrova; prireikus priveržti.	Kasmet (prof. pr.)	„ACSI“	
5.4	Patikrinti srovę ribojančius rezistorius, prijungtus prie plazmos ir ištraukimo lęšių. Išmatuoti jų atsparumą ir palyginti su nurodytomis vertėmis. Jei atrodo, kad jie sudegė, buvo paveiki spinduliuotės arba nukrypo nuo nurodytos vertės 10 proc., juos pakeisti.	Kasmet (prof. pr.)	„ACSI“	
5.5	Patikrinti, ar plastikiniuose vamzdžiuose nėra parudavimų, ir, jei reikia, pakeisti.	Kasmet (prof. pr.)	„ACSI“	
5.6	Nuvalyti ISIS narvą ir jonų šaltinio lęšių izoliatorius.	Kasmet (prof. pr.)	„ACSI“	

TAIKINIAI				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasiraš o / data
8.1	Pakeisti abiejų helio siurblių diafragmas *: dažnis priklauso nuo naudojimo.	Kas ketvirtį*	Klientas	
8.2	Atstatyti taikinį (pakeisti folijas ir plombas) *: dažnis priklauso nuo naudojimo.	Kas ketvirtį*	Klientas	
8.3	Pakeisti perdavimo linijas iš taikinio į skirstyklą (arba MPV) ir iš švirkšto skydo į skirstyklą (arba MPV).	Kasmet (prof. pr.)	Klientas	
8.4	Pakeisti vandens ir helio aušinimo linijas iš taikinių ir pertvarų iki vandens kolektorių.	Kasmet (prof. pr.)	„ACSI“*	
8.5	Helio aušinimo sistemoje pakeisti pintas silikonines žarnas.	Kasmet (prof. pr.)	„ACSI“*	

**** Metinę profilaktinę priežiūrą gali atlikti tinkamai apmokytas ir „ACSI“ patvirtintas***

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PASLAUGOS				
Nr.	Procedūros aprašas	Dažnis	Atsakomybė	Pasiraš o / data
7.1	Atlikti vandens sistemos stebėjimo patikrinimus, laikantis pateiktuose dokumentuose aprašytos tvarkos. Vizualiai patikrinti, ar nėra vandens nuotėkio.	Kas savaitę (prof. pr.)	Klientas	
7.2	Užregistruoti oro slėgį kolektoriuje šiose situacijose: RF oro tiekimas atidarytas:_____ psi RF slėgis: _ psi RF oro tiekimas uždarytas: ___psi ir patikrinti, ar jis atitinka pateiktame dokumente nurodytas vertes.	Kas mėnesį (prof. pr.)	Klientas	
7.3	Užfiksuoti šias su vandens aušinimo sistema susijusias vertes: Temperatūra:_____ °C. Varža:_____ MΩ.cm Vandens kolektorius: Tiekimo slėgis: _____psi. Grįžimo slėgis: _____ psi Patikrinti, ar jos atitinka pateiktame dokumente nurodytas vertes.	Kas mėnesį (prof. pr.)	Klientas	
7.4	Užfiksuoti kiekvieno kolektoriaus vandens srauto matuoklio vertes ir palyginti jas su pateiktuose dokumentuose nurodyta verte. Žr. C priedą.	Kas mėnesį (prof. pr.)	Klientas	
7.5	Pakeisti kasetes 5 µ filtrų vienetuose. *: dažnis priklauso nuo vandens kokybės ir į sistemą įpilto vandens kiekio.	Kas pusmetį (prof. pr.)	Klientas	
7.6	Įkrauti arba pakeisti dejonizuojančias kolonas. *: Kasmet, jei vietos vandens kokybė yra normali. Kas pusmetį, jei vietos vanduo yra „kietas“	Kas pusmetį* (prof. pr.)	Klientas	
7.7	Patikrinti, ar elektrinio skydo durelės yra sandarios.	Kasmet (prof. pr.)	„ACSI“	
7.8	Patikrinti elektros jungtis elektros skydelyje; įsitikinkite, kad dėl vibracijos jungtys neatsilaisvino.	Kasmet (prof. pr.)	„ACSI“	
7.9	Sumažinti kiekvieno kolektoriaus srauto matuoklio srautą ir patvirtinti, kad jungiklis suveikė pasiekus nurodytą vertę arba neženkliai ją viršijus.	Kasmet (prof. pr.)	„ACSI“	
7.10	Nuskaityti ir užfiksuoti temperatūros pokyčius antriniame šilumokaityje; nuskaityti ir užfiksuoti srauto greitį per šilumokaitį; apskaičiuoti ir užfiksuoti šilumą, paimtą iš antrinio aušinimo vandens.	Kasmet (prof. pr.)	„ACSI“	
7.11	Padidinti vandens paketo slėgį ir patvirtinti, kad slėgis stabilizuojasi apie nurodytą viršslėgio vožtuvo vertę.	Kasmet (prof. pr.)	„ACSI“	
7.12	Pakeisti nustatytą vandens temperatūrą, kad ji 4 °C viršytų einamąją vertę. Patvirtinti, kad 3 krypčių maišymo vožtuvas reaguoja į naują nuostatį. Pakartoti procedūrą nustatant 2 °C žemesnį už einamąjį nuostatį.	Kasmet (prof. pr.)	„ACSI“	

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7.13	Patikrinti slėgio lygius ir palyginti juos su pateiktuose dokumentuose nurodytomis vertėmis. Jei reikia, sureguliuoti atitinkamus diskinius vožtuvus.	Kasmet (prof. pr.)	„ACSI“	

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4. Rekomendacijos / pastabos

Šiame dokumente pateikti parašai, rekomendacijos ir komentarai yra susiję su profilaktinės priežiūros vizito metu atliktais darbais.

Data: _____

„ACSI“ ATSTOVAS (vardas, pavardė ir parašas)

_____

Data: _____

KLIENTO ATSTOVAS (vardas, pavardė ir parašas)

_____

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A priedas. Informacija apie radijo dažnių sistemą

Aprašas		Sistema **be** sijos ☐ Netaikytina	Sistema **su** sija ☐ Netaikytina	Pastaba
Jungties padėtis	Nustatyti			
	Atkūrimas			
Derintuvo padėtis	Nustatyti			
	Atkūrimas			
Siurblio lygis IG01				
P_{FWD} (skalė)		kW	kW	
P_{REF} (skalė)		kW	kW	
HVPS	U_a	kV	V	
	I_a	A	A	
Plokštelė	Įtampa	kV	V	
	Current	mA	mA	
Tinklelis	U_g	V	V	
	I_g	mA	mA	
Ekranas	U_s	V	V	
	I_s	mA	mA	
Tvarkyklė	P_{FWD}	W	W	
	P_{REF}	W	W	
Siūlas U_f		V	V	
Siūlo tarnavimo laikas		valandos	valandos	
Sintezatoriaus lygis		MHz dBm	MHz dBm	
Lemputės būsena		Visi įjungti:	Visi įjungti:	
„Ctrl“ vietoje / per atstumą				

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Numatytosios radijo dažnio vertės	☐ Netai kytina
Pradūros įtampa	kV
Kondicionavimo įtampa	kV
Darbinė įtampa	kV
Fazė	
Derintuvo šaltoji padėtis	
Derintuvo pradinė padėtis	
Jungties padėtis	

Radijo dažnių paslaugos	☐ Netai kytina
Vandens tiekimas	psi
Vandens grįžimas	psi
Derintuvo oro srautas	lpm
Sukabintuvo oro srautas	lpm
Išėjimo krūvis	
Įėjimo krūvis	
Įėjimų suderinimas	

B priedas: ISIS ir MM sistemų informacija

ISIS	☐ Netai kytina
Rezistorius 1 (100 Ω)	Ω
Rezistorius 2 (1 KΩ)	KΩ
Rezistorius 4 (50 MΩ)	MΩ
Minimalios srovės rezistorius (4,7 arba 5,0 KΩ)	KΩ
CP ir CCP	**☐ Netai kytina**
Statinis slėgis	psi
Darbinis slėgis	psi
CP01 temperatūra	K
CP02 temperatūra	K

MM informacija	☐ Netai kytina
Išėjimo įtampa	
Tranzistoriaus įtampa	
Išėjimo srovė	
Pirminė įtampa	
Nustatyti / atkurti srovę	/ A
Antrinė įtampa	
Proteus dažnis	

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C priedas. Vandens sistema

Žyma	Aprašas	Srautas (l/min)	Atsk. srautas (l/min)	Pastaba
Ciklotrono vandens kolektorius				☐ Netaikytina
TG S1	Taikinio pusė 1			
TG S2	Taikinio pusė 2			
ISIS 1				
ISIS 2				
ISIS 2				
ISIS 3				
ISIS 4				
ISIS 5				
MMCU+MMCL	MM ritė viršutinė + apatinė			
RF 1	RF fiksuotas (apatinis)			
RF 2	RF kintamas (viršutinis)			
VISO				
Spintos vandens kolektorius				☐ Netaikytina
CCP / TP	Kriologinis kompresorius + Turbo siurbliai			
MMPS	Pagrindinio magneto maitinimas			
	Radijo dažnių stiprintuvas			
	Radijo dažnių modeliavimo apkrova (125 kW)			
VISO				

Vertimas atliktas vertimų biure „AIRV“, į. k. 134819573, Raugyklos g. 4ª / Šv. Stepono g. 7, Vilnius.
Vertimo tikrumą ir atitiktį originaliam tekstui liudiju.
The above text was translated in the translation agency AIRV, company code 134819573, Raugyklos g. 4A, Vilnius.
I hereby witness that the translation conforms the original text.

Vertėja
Translator / Переводчик
Goda Remeikaitė

AirV vertimų biuras

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11 nr.

TR-19 RECOMMENDED SPARES (BASIC)

Part Number	Description	Qty	Unit Price (Euro)	Total Price (Euro)	Subsystem
BRD A2004-CRYO	CRYOPUMP TEMPERATURE MODULE	1	2,807.69	2,807.69	Cyclotron (Controls)
BRD A2004-CURR	CURRENT AMPLIFICATION MODULE	1	2,807.69	2,807.69	Cyclotron (Controls)
BRD A2004-OPTO	OPTICAL LINK MODULE	1	3,061.54	3,061.54	Cyclotron (Controls)
BRD A2004-POSU	POWER SUPPLY MODULE	1	3,061.54	3,061.54	Cyclotron (Controls)
REL 84130104	SOLID STATE RELAY - CROUZET I/O Module	1	100.00	100.00	Cyclotron (Controls)
RES MOX2-12-1000J	RESISTOR MOX 2-12, 100 Ohm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-1001J	RESISTOR MOX 2-12, 1 KOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-4701J	RESISTOR MOX 2-12, 4.7 or 5 KOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-5005J	RESISTOR, MOX 2-12, 50 MOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
IS-1291_KIT	INSULATOR KIT FOR INFLECTOR IS-1291	1	992.31	992.31	Cyclotron (ISIS)
	POST INSULATOR KIT	1	1,046.15	1,046.15	Cyclotron (ISIS)
IS-1167	FILAMENT KIT #3 FULL (TA SINGLE PAIR)	1	2,407.69	2,407.69	Cyclotron (ISIS)
PR-0508	RADIAL NUT MOUNT FOR EPR	1	376.92	376.92	Cyclotron (Extraction Probe)
PR-0509	AZIMUTHAL NUT MOUNT FOR EPR	1	376.92	376.92	Cyclotron (Extraction Probe)
PR-0511	VESPEL PIN	2	107.69	215.38	Cyclotron (Extraction Probe)
PR-0514	VESPEL BUSHING - EXTRACTION PROBE	1	115.38	115.38	Cyclotron (Extraction Probe)
PR-0532	VESPEL WASHER	2	38.46	76.92	Cyclotron (Extraction Probe)
PR-0538	4MM VESPEL PIN - EXT PROBE	1	103.85	103.85	Cyclotron (Extraction Probe)
PR-0552	POTENTIOMETER - EXT PROBE	1	276.92	276.92	Cyclotron (Extraction Probe)
PR-0740	FOIL HOLDER ASSY - EXT PROBE	2	365.38	730.77	Cyclotron (ISIS)
PR-0914	VESPEL SLEEVE, TR PET	1	176.92	176.92	Cyclotron (ISIS)
PR-0916	VESPEL WASHER, TR PET	1	38.46	38.46	Cyclotron (ISIS)
MOT GM8222D577	DC GEAR MOTOR 581.8:1, BRUSHED	1	346.15	346.15	Cyclotron (Extraction Probe)
VS-0542	VENT VALVE ASSEMBLY	1	584.62	584.62	Cyclotron (Vacuum)
VS-0599	O-RING KIT TR-19 & TR-24 MAIN TANK	1	107.69	107.69	Cyclotron (Vacuum)
GAU L9090302	CONVECTORR GAUGE 1.33" CF	1	315.38	315.38	Cyclotron (Vacuum)
GAU L9090305	CONVECTORR GAUGE NW16	1	315.38	315.38	Cyclotron (Vacuum)
GAU X3203-60004	MBA2-200 DUAL YTTRIA-IRIDIUM FILS - NW40	1	615.38	615.38	Cyclotron (Vacuum)
GAU X3203-60005	MBA2-200 DUAL YTTRIA-IRIDIUM FILS- 2.75C	1	653.85	653.85	Cyclotron (Vacuum)
GAS VZVIT19	GASKET VITON 1-1/3"	1	61.54	61.54	Cyclotron (Vacuum)
GAS VZVIT38	GASKET VITON 2-3/4"	1	46.15	46.15	Cyclotron (Vacuum)
RF-1040_KIT	KAPTON INSULATORS KIT FOR DC BLOCKER	1	446.15	446.15	Cyclotron (RF)
H WAS CM3	M3 CERAMIC HAT WASHER	4	19.23	76.92	Targetry (F18)
	Fittings kit for TA-1239 / TA-1243	1	169.23	169.23	Targetry (F18)
TA-0023	DRIVE NUT TARGET SELECTOR TR PET	1	111.54	111.54	Targetry (F18)
TA-0084	GEAR MOTOR ASSY TARGET SELECTOR TR PET	1	600.00	600.00	Targetry (F18)
TA-1108	INSULATOR PLATE, TS TRPET	1	138.46	138.46	Targetry (F18)
TA-1148	HALVE RING INSULATOR, TS, TR PET	1	100.00	100.00	Targetry (F18)
TA-1151	INSULATOR BUSHING, TS, TR PET	1	100.00	100.00	Targetry (F18)
TA-2007	PRESSURE TRANSDUCER ASSEMBLY 1000PSI	1	415.38	415.38	Targetry (F18)
CH-0549	PRESSURE TRANSDUCER AMP 2-CHAN ASSY	1	876.92	876.92	Targetry (F18)
SYR PS-101488-S	SYRINGE 5ml, Series C 1/4-20 THREAD TIP	1	192.31	192.31	Targetry (F18)
CYCLOTRON GEN FUSE SE	SET OF 40 FNQ AND 25 MDA FUSES (FROM 1A TO	1	515.38	515.38	Cyclotron
CYCLOTRON SWAGELOK SI	SET OF SWAGELOK FITTINGS AND INSERTS	1	1,746.15	1,746.15	Cyclotron

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TR-19 RECOMMENDED SPARES (EXTENDED)

Part Number	Description	Qty	Unit Price (Euro)	Total Price (Euro)	Subsystem
POW PS/EW30N20.0-11	Power Supply 0 to -30KV, 20mA	1	7,446.15	7,446.15	Cyclotron (ISIS)
POW PS/MJ 10P1500-11	Power Supply 0 to +10KV, 1.5mA	1	1,523.08	1,523.08	Cyclotron (ISIS)
POW PS/MJ 10N1500-11	Power Supply 0 to -10KV, 1.5mA	1	1,523.08	1,523.08	Cyclotron (ISIS)
POW PS/FC05P24.0-11	Power Supply 0/+5kV, 24mA	1	3,723.08	3,723.08	Cyclotron (ISIS)
POW XFR 7.5-300-M2	POWER SUPPLY 0 -TO +7.5V, 0 TO +300A	1	7,392.31	7,392.31	Cyclotron (ISIS)
POW XFR100-28-M2	POWER SUPPLY 0 TO +100V, 0 - 28A	1	7,392.31	7,392.31	Cyclotron (ISIS)
POW XG33-50	POWER SUPPLY 0-33VDC, 0-50A	1	4,507.69	4,507.69	Cyclotron (ISIS)
POW HPD30-10-MAA-M1	POWER SUPPLY 0 - 30VDC, 0 - 10A	1	3,830.77	3,830.77	Cyclotron (ISIS)
POW XT-7-6-MAA-M43	POWER SUPPLY 0 - 7 Vdc, 0 - 6A WITH APG	1	2,530.77	2,530.77	Cyclotron (ISIS)
CONT 1179A00721CS1BV	HYDROGEN MASS FLOW CONTROLLER	1	2,484.62	2,484.62	Cyclotron (ISIS)
IS-0263	PLASMA ELECTRODE INSULATOR ISIS	1	2,976.92	2,976.92	Cyclotron (ISIS)
IS-0265	EXTRACTION LENS INSULATOR ELECTRODE	1	2,992.31	2,992.31	Cyclotron (ISIS)
IS-0440	PLASMA LENS PLATE	1	707.69	707.69	Cyclotron (ISIS)
IS-0466	MAIN INS 25KV ASSY EXTRACTION ELECTRODES	1	3,307.69	3,307.69	Cyclotron (ISIS)
IS-1290	INFLECTOR AND JIG ASSEMBLY - TR19	1	9,123.08	9,123.08	Cyclotron (ISIS)
IS-1311	BACKPLATE ASSEMBLY	1	17,769.23	17,769.23	Cyclotron (ISIS)
POW PSB24-120	POWER SUPPLY 24V DC 120W	1	157.69	157.69	Cyclotron (Controls)
POW 1606-XLS240E	POWER SUPPLY 24 VDC, 10A, ALLEN-BRADLEY	1	584.62	584.62	Cyclotron (Controls)
POW 1606-XLS480E	POWER SUPPLY 24 VDC, 20A, ALLEN-BRADLEY	1	830.77	830.77	Cyclotron (Controls)
POW 1756-PA75	PS CONTROLLOGIX PLC 85..265VAC (5V @13A)	1	1,369.23	1,369.23	Cyclotron (Controls)
CONT 1756-L72	CONTROLLER,CONTROLLOGIX ,4MB MEMORY	1	8,423.08	8,423.08	Cyclotron (Controls)
CONT 1756-ENBT	CLX ETHERNET/IP 10/100 BRIDGE MODULE	1	2,615.38	2,615.38	Cyclotron (Controls)
CONT 1756-IB16	10/31 VDC INPUT 16 PTS (20 PIN)	1	476.92	476.92	Cyclotron (Controls)
CONT 1756-IV16	10/30 VDC SOURCING INPUT 16 PTS (20 PIN)	1	476.92	476.92	Cyclotron (Controls)
CONT 1756-IF16	ANALOG INPUT CURRENT/VOLT 16 PTS (36PIN)	1	1,869.23	1,869.23	Cyclotron (Controls)
CONT 1756-OF8	OUTPUT MODULE 8 POINT, ANALOG, (20 PIN)	1	2,369.23	2,369.23	Cyclotron (Controls)
CONT 1756-OV16E	10/31VDC ELEC FUSE OUTPUT 16 PTS(20 PIN)	1	715.38	715.38	Cyclotron (Controls)
CONT 1756-OB16E	10/31VDC ELEC FUSE OUTPUT 16 PTS(20 PIN)	1	715.38	715.38	Cyclotron (Controls)
THE 4344-13-223	KLIXON THERMOSTAT	1	92.31	92.31	Cyclotron (Controls)
CH-0707	4 POSITION VALVE ASSEMBLY	1	2,361.54	2,361.54	Targetry (F18)
CH-0708	6 POSTION VALVE ASSEMBLY	1	2,630.77	2,630.77	Targetry (F18)
TA-1317	POTENTIOMETER DRIVE ASSY, TS, TR-PET	1	2,076.92	2,076.92	Targetry (F18)
TA-1228	COLLIMATOR SEGMENT #1	2	300.00	600.00	Targetry (F18)
TA-1229	COLLIMATOR SEGMENT #2	2	300.00	600.00	Targetry (F18)
TA-1238A	AL-NITRIDE INSULATOR RING, TS, TR-PET	1	669.23	669.23	Targetry (F18)
TA-1535	3 PORT TARGET SELECTOR MOUNTING PL ASSY	1	21,538.46	21,538.46	Targetry (F18)
TA-1145	BELLOWS ASSY, TS, TR PET	1	8,076.92	8,076.92	Targetry (F18)
TA-1568	INSULATOR PLATE, TARGET SELECTOR, TR-PET	1	715.38	715.38	Targetry (F18)
TA-1571	LATCH, TARGET SELECTOR, TR-PET	1	346.15	346.15	Targetry (F18)
FTRU IFTBG022038B	BNC COAXIAL ELEC.FEEDTHRU NW40 SS304	1	284.62	284.62	Targetry (F18)
VLV 6624-241434	Burkert 3/2-Way Valve 24V (UNFB Connect)	1	284.62	284.62	Targetry (F18)
CYL 6498K123	AIR CYLINDER, 7/16" BORE X 3" STROKE	1	69.23	69.23	Targetry (F18)
PUM 29585 MB-602	HELIUM PUMP MB-602 W/TEFLON VALVE	1	9,846.15	9,846.15	Targetry (HeCS)
EXC 35115K61	HEAT EXCHANGER, Brazed Plate, 3/4 Pipe	1	492.31	492.31	Targetry (HeCS)
PUM 9499320	ROTARY VANE PUMP - DS 202	1	3,215.38	3,215.38	Cyclotron (Vacuum)
PUM 10227	CP-8 CRYO PUMP ISO200 WITH DIODE	1	13,269.23	13,269.23	Cyclotron (Vacuum)
PUM 8080300K001	9600 CRYO COMPRESSOR ADSORBER KIT	1	1,392.31	1,392.31	Cyclotron (Vacuum)
HTR 8080250K020	PURGE GAS HEATER 110 VAC	1	1,861.54	1,861.54	Cyclotron (Vacuum)
VLV 8080250K023	KIT, PURGE GAS VALVE 110V 250PSI	1	1,000.00	1,000.00	Cyclotron (Vacuum)
PUM TG1300MBWB	MAG-LEVCOMPOUND TURBOMOLECULAR PUMP	1	19,461.54	19,461.54	Cyclotron (Vacuum)
VLV 08138-FA24-ALV1	VAT GATE VALVE DN80 DUAL LIMIT SWITCHES	1	3,507.69	3,507.69	Cyclotron (Vacuum)
VS-0573	TURBOPUMP VENT VALVE	1	1,100.00	1,100.00	Cyclotron (Vacuum)
TRI 3CW20000A7	TRIODE AMP TUBE WATER COOLED	1	12,076.92	12,076.92	Cyclotron (RF Amplifier)
AMP CE-500ACS-85	RF AMPLIFIER SOLID STATE DRIVER 500W	1	17,769.23	17,769.23	Cyclotron (RF Amplifier)
CAP SPFT3202MA	FEEDTHRU CERAMIC CAPACITOR 2000pF, 20kV	1	1,800.00	1,800.00	Cyclotron (RF Amplifier)
DIO KHP-25	HV DIODE 25KV,2.25A	1	600.00	600.00	Cyclotron (RF Amplifier)
HOS 12-200PSI	RUBBER HOSE,1/2"ID,200 PSI,4 SPIRALS,RED - 100ft.	1	153.85	153.85	Cyclotron (Services)
HOS 12-200PSI	RUBBER HOSE,3/4"ID,200 PSI,4 SPIRALS,RED - 100ft.	1	200.00	200.00	Cyclotron (Services)
MET DSV-2103H	FLOWMETER WITH SWITCH,1/2" NPT,1-4.5 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2104H	FLOWMETER WITH SWITCH,1/2" NPT,1-10 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2105H	FLOWMETER WITH SWITCH,1/2" NPT,2-18 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2106H	FLOWMETER WITH SWITCH,3/4"NPT,2.5-25LPM	1	876.92	876.92	Cyclotron (Services)

Vertimas iš anglų kalbos

/ACSI logotipas/ /rekvizitai/

TR-19 REKOMENDUOJAMOS (PAGRINDINĖS) ATSARGINĖS DALYS

Produkto kodas	Aprašymas	Kiekis	Vnt. kaina (Eur)	Bendra kaina (Eur)	Posistemė
BRD A2004-CRYO	CRYOPUMP TEMPERATURE MODULE	1	2,807.69	2,807.69	Cyclotron (Controls)
BRD A2004-CURR	CURRENT AMPLIFICATION MODULE	1	2,807.69	2,807.69	Cyclotron (Controls)
BRD A2004-OPTO	OPTICAL LINK MODULE	1	3,061.54	3,061.54	Cyclotron (Controls)
BRD A2004-POSU	POWER SUPPLY MODULE	1	3,061.54	3,061.54	Cyclotron (Controls)
REL 84130104	SOLID STATE RELAY - CROUZET I/O Module	1	100.00	100.00	Cyclotron (Controls)
RES MOX2-12-1000J	RESISTOR MOX 2-12, 100 Ohm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-1001J	RESISTOR MOX 2-12, 1 KOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-4701J	RESISTOR MOX 2-12, 4.7 or 5 KOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
RES MOX2-12-5005J	RESISTOR, MOX 2-12, 50 MOhm, 5W, 5%	1	19.23	19.23	Cyclotron (ISIS)
IS-1291_KIT	INSULATOR KIT FOR INFLECTOR IS-1291	1	992.31	992.31	Cyclotron (ISIS)
	POST INSULATOR KIT	1	1,046.15	1,046.15	Cyclotron (ISIS)
IS-1167	FILAMENT KIT #3 FULL (TA SINGLE PAIR)	1	2,407.69	2,407.69	Cyclotron (ISIS)
PR-0508	RADIAL NUT MOUNT FOR EPR	1	376.92	376.92	Cyclotron (Extraction Probe)
PR-0509	AZIMUTHAL NUT MOUNT FOR EPR	1	376.92	376.92	Cyclotron (Extraction Probe)
PR-0511	VESPEL PIN	2	107.69	215.38	Cyclotron (Extraction Probe)
PR-0514	VESPEL BUSHING - EXTRACTION PROBE	1	115.38	115.38	Cyclotron (Extraction Probe)
PR-0532	VESPEL WASHER	2	38.46	76.92	Cyclotron (Extraction Probe)
PR-0538	4MM VESPEL PIN - EXT PROBE	1	103.85	103.85	Cyclotron (Extraction Probe)
PR-0552	POTENTIOMETER - EXT PROBE	1	276.92	276.92	Cyclotron (Extraction Probe)
PR-0740	FOIL HOLDER ASSY - EXT PROBE	2	365.38	730.77	Cyclotron (ISIS)
PR-0914	VESPEL SLEEVE, TR PET	1	176.92	176.92	Cyclotron (ISIS)
PR-0916	VESPEL WASHER, TR PET	1	38.46	38.46	Cyclotron (ISIS)
MOT GM8222D577	DC GEAR MOTOR 581.8:1, BRUSHED	1	346.15	346.15	Cyclotron (Extraction Probe)
VS-0542	VENT VALVE ASSEMBLY	1	584.62	584.62	Cyclotron (Vacuum)
VS-0599	O-RING KIT TR-19 & TR-24 MAIN TANK	1	107.69	107.69	Cyclotron (Vacuum)
GAU L9090302	CONVECTORR GAUGE 1.33" CF	1	315.38	315.38	Cyclotron (Vacuum)
GAU L9090305	CONVECTORR GAUGE NW16	1	315.38	315.38	Cyclotron (Vacuum)
GAU X3203-60004	MBA2-200 DUAL YTTRIA-IRIDIUM FILS - NW40	1	615.38	615.38	Cyclotron (Vacuum)
GAU X3203-60005	MBA2-200 DUAL YTTRIA-IRIDIUM FILS- 2.75C	1	653.85	653.85	Cyclotron (Vacuum)
GAS VZVIT19	GASKET VITON 1-1/3"	1	61.54	61.54	Cyclotron (Vacuum)
GAS VZVIT38	GASKET VITON 2-3/4"	1	46.15	46.15	Cyclotron (Vacuum)
RF-1040_KIT	KAPTON INSULATORS KIT FOR DC BLOCKER	1	446.15	446.15	Cyclotron (RF)
H WAS CM3	M3 CERAMIC HAT WASHER	4	19.23	76.92	Targetry (F18)
	Fittings kit for TA-1239 / TA-1243	1	169.23	169.23	Targetry (F18)
TA-0023	DRIVE NUT TARGET SELECTOR TR PET	1	111.54	111.54	Targetry (F18)
TA-0084	GEAR MOTOR ASSY TARGET SELECTOR TR PET	1	600.00	600.00	Targetry (F18)
TA-1108	INSULATOR PLATE, TS TRPET	1	138.46	138.46	Targetry (F18)
TA-1148	HALVE RING INSULATOR, TS, TR PET	1	100.00	100.00	Targetry (F18)
TA-1151	INSULATOR BUSHING, TS, TR PET	1	100.00	100.00	Targetry (F18)
TA-2007	PRESSURE TRANSDUCER ASSEMBLY 1000PSI	1	415.38	415.38	Targetry (F18)
CH-0549	PRESSURE TRANSDUCER AMP 2-CHAN ASSY	1	876.92	876.92	Targetry (F18)
SYR PS-101488-S	SYRINGE 5ml, Series C 1/4-20 THREAD TIP	1	192.31	192.31	Targetry (F18)
CYCLOTRON GEN FUSE SE	SET OF 40 FNQ AND 25 MDA FUSES (FROM 1A TO	1	515.38	515.38	Cyclotron
CYCLOTRON SWAGELOK SI	SET OF SWAGELOK FITTINGS AND INSERTS	1	1,746.15	1,746.15	Cyclotron

/ACSI logotipas/ /rekvizitai/

TR-19 REKOMENDUOJAMOS (PAGRINDINĖS) ATSARGINĖS DALYS (TĘSINYS)

Produkto kodas	Aprašymas	Kiekis	Vnt. kaina (Eur)	Bendra kaina (Eur)	Posistemė
POW PS/EW30N20.0-11	Power Supply 0 to -30KV, 20mA	1	7,446.15	7,446.15	Cyclotron (ISIS)
POW PS/MJ 10P1500-11	Power Supply 0 to +10KV, 1.5mA	1	1,523.08	1,523.08	Cyclotron (ISIS)
POW PS/MJ 10N1500-11	Power Supply 0 to -10KV, 1.5mA	1	1,523.08	1,523.08	Cyclotron (ISIS)
POW PS/FC05P24.0-11	Power Supply 0/+5kV, 24mA	1	3,723.08	3,723.08	Cyclotron (ISIS)
POW XFR 7.5-300-M2	POWER SUPPLY 0 -TO +7.5V, 0 TO +300A	1	7,392.31	7,392.31	Cyclotron (ISIS)
POW XFR100-28-M2	POWER SUPPLY 0 TO +100V, 0 - 28A	1	7,392.31	7,392.31	Cyclotron (ISIS)
POW XG33-50	POWER SUPPLY 0-33VDC, 0-50A	1	4,507.69	4,507.69	Cyclotron (ISIS)
POW HPD30-10-MAA-M1	POWER SUPPLY 0 - 30VDC, 0 - 10A	1	3,830.77	3,830.77	Cyclotron (ISIS)
POW XT-7-6-MAA-M43	POWER SUPPLY 0 - 7 Vdc, 0 - 6A WITH APG	1	2,530.77	2,530.77	Cyclotron (ISIS)
CONT 1179A00721CS1BV	HYDROGEN MASS FLOW CONTROLLER	1	2,484.62	2,484.62	Cyclotron (ISIS)
IS-0263	PLASMA ELECTRODE INSULATOR ISIS	1	2,976.92	2,976.92	Cyclotron (ISIS)
IS-0265	EXTRACTION LENS INSULATOR ELECTRODE	1	2,992.31	2,992.31	Cyclotron (ISIS)
IS-0440	PLASMA LENS PLATE	1	707.69	707.69	Cyclotron (ISIS)
IS-0466	MAIN INS 25KV ASSY EXTRACTION ELECTRODES	1	3,307.69	3,307.69	Cyclotron (ISIS)
IS-1290	INFLECTOR AND JIG ASSEMBLY - TR19	1	9,123.08	9,123.08	Cyclotron (ISIS)
IS-1311	BACKPLATE ASSEMBLY	1	17,769.23	17,769.23	Cyclotron (ISIS)
POW PSB24-120	POWER SUPPLY 24V DC 120W	1	157.69	157.69	Cyclotron (Controls)
POW 1606-XLS240E	POWER SUPPLY 24 VDC, 10A, ALLEN-BRADLEY	1	584.62	584.62	Cyclotron (Controls)
POW 1606-XLS480E	POWER SUPPLY 24 VDC, 20A, ALLEN-BRADLEY	1	830.77	830.77	Cyclotron (Controls)
POW 1756-PA75	PS CONTROLLOGIX PLC 85..265VAC (5V @13A)	1	1,369.23	1,369.23	Cyclotron (Controls)
CONT 1756-L72	CONTROLLER,CONTROLLOGIX ,4MB MEMORY	1	8,423.08	8,423.08	Cyclotron (Controls)
CONT 1756-ENBT	CLX ETHERNET/IP 10/100 BRIDGE MODULE	1	2,615.38	2,615.38	Cyclotron (Controls)
CONT 1756-IB16	10/31 VDC INPUT 16 PTS (20 PIN)	1	476.92	476.92	Cyclotron (Controls)
CONT 1756-IV16	10/30 VDC SOURCING INPUT 16 PTS (20 PIN)	1	476.92	476.92	Cyclotron (Controls)
CONT 1756-IF16	ANALOG INPUT CURRENT/VOLT 16 PTS (36PIN)	1	1,869.23	1,869.23	Cyclotron (Controls)
CONT 1756-OF8	OUTPUT MODULE 8 POINT, ANALOG, (20 PIN)	1	2,369.23	2,369.23	Cyclotron (Controls)
CONT 1756-OV16E	10/31VDC ELEC FUSE OUTPUT 16 PTS(20 PIN)	1	715.38	715.38	Cyclotron (Controls)
CONT 1756-OB16E	10/31VDC ELEC FUSE OUTPUT 16 PTS(20 PIN)	1	715.38	715.38	Cyclotron (Controls)
THE 4344-13-223	KLIXON THERMOSTAT	1	92.31	92.31	Cyclotron (Controls)
CH-0707	4 POSITION VALVE ASSEMBLY	1	2,361.54	2,361.54	Targetry (F18)
CH-0708	6 POSTION VALVE ASSEMBLY	1	2,630.77	2,630.77	Targetry (F18)
TA-1317	POTENTIOMETER DRIVE ASSY, TS, TR-PET	1	2,076.92	2,076.92	Targetry (F18)
TA-1228	COLLIMATOR SEGMENT #1	2	300.00	600.00	Targetry (F18)
TA-1229	COLLIMATOR SEGMENT #2	2	300.00	600.00	Targetry (F18)
TA-1238A	AL-NITRIDE INSULATOR RING, TS, TR-PET	1	669.23	669.23	Targetry (F18)
TA-1535	3 PORT TARGET SELECTOR MOUNTING PL ASSY	1	21,538.46	21,538.46	Targetry (F18)
TA-1145	BELLOWS ASSY, TS, TR PET	1	8,076.92	8,076.92	Targetry (F18)
TA-1568	INSULATOR PLATE, TARGET SELECTOR, TR-PET	1	715.38	715.38	Targetry (F18)
TA-1571	LATCH, TARGET SELECTOR, TR-PET	1	346.15	346.15	Targetry (F18)
FTRU IFTBG022038B	BNC COAXIAL ELEC.FEEDTHRU NW40 SS304	1	284.62	284.62	Targetry (F18)
VLV 6624-241434	Burkert 3/2-Way Valve 24V (UNFB Connect)	1	284.62	284.62	Targetry (F18)
CYL 6498K123	AIR CYLINDER, 7/16" BORE X 3" STROKE	1	69.23	69.23	Targetry (F18)
PUM 29585 MB-602	HELIUM PUMP MB-602 W/TEFLON VALVE	1	9,846.15	9,846.15	Targetry (HeCS)
EXC 35115K61	HEAT EXCHANGER, Brazed Plate, 3/4 Pipe	1	492.31	492.31	Targetry (HeCS)
PUM 9499320	ROTARY VANE PUMP - DS 202	1	3,215.38	3,215.38	Cyclotron (Vacuum)
PUM 10227	CP-8 CRYO PUMP ISO200 WITH DIODE	1	13,269.23	13,269.23	Cyclotron (Vacuum)
PUM 8080300K001	9600 CRYO COMPRESSOR ADSORBER KIT	1	1,392.31	1,392.31	Cyclotron (Vacuum)
HTR 8080250K020	PURGE GAS HEATER 110 VAC	1	1,861.54	1,861.54	Cyclotron (Vacuum)
VLV 8080250K023	KIT, PURGE GAS VALVE 110V 250PSI	1	1,000.00	1,000.00	Cyclotron (Vacuum)
PUM TG1300MBWB	MAG-LEVCOMPOUND TURBOMOLECULAR PUMP	1	19,461.54	19,461.54	Cyclotron (Vacuum)
VLV 08138-FA24-ALV1	VAT GATE VALVE DN80 DUAL LIMIT SWITCHES	1	3,507.69	3,507.69	Cyclotron (Vacuum)
VS-0573	TURBOPUMP VENT VALVE	1	1,100.00	1,100.00	Cyclotron (Vacuum)
TRI 3CW20000A7	TRIODE AMP TUBE WATER COOLED	1	12,076.92	12,076.92	Cyclotron (RF Amplifier)
AMP CE-500ACS-85	RF AMPLIFIER SOLID STATE DRIVER 500W	1	17,769.23	17,769.23	Cyclotron (RF Amplifier)
CAP SPFT3202MA	FEEDTHRU CERAMIC CAPACITOR 2000pF, 20kV	1	1,800.00	1,800.00	Cyclotron (RF Amplifier)
DIO KHP-25	HV DIODE 25KV,2.25A	1	600.00	600.00	Cyclotron (RF Amplifier)
HOS 12-200PSI	RUBBER HOSE,1/2"ID,200 PSI,4 SPIRALS,RED - 100ft.	1	153.85	153.85	Cyclotron (Services)
HOS 12-200PSI	RUBBER HOSE,3/4"ID,200 PSI,4 SPIRALS,RED - 100ft.	1	200.00	200.00	Cyclotron (Services)
MET DSV-2103H	FLOWMETER WITH SWITCH,1/2" NPT,1-4.5 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2104H	FLOWMETER WITH SWITCH,1/2" NPT,1-10 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2105H	FLOWMETER WITH SWITCH,1/2" NPT,2-18 LPM	1	507.69	507.69	Cyclotron (Services)
MET DSV-2106H	FLOWMETER WITH SWITCH,3/4"NPT,2.5-25LPM	1	876.92	876.92	Cyclotron (Services)

Tikslus dokumento vertimas į lietuvių kalbą
Vertėja Akvilė Gegelevičienė
Data 2020-08-05
UAB Diamedica
Gėlių g. 2, Avižieniai, Lietuva