



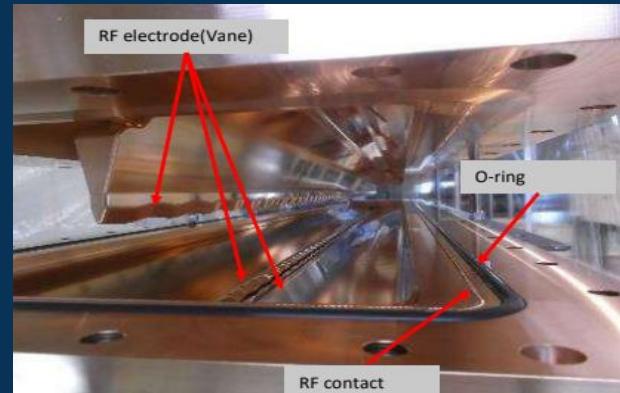
# BNCT Demonstrator

- The Hungarian Academy of Sciences Center for Energy Research is funding a 10 M€ Boron-Neutron Capture Therapy (BNCT) technology demonstrator near Budapest
- In the fall of 2021, we were asked to implement Blinky-Lite for the global control system interfacing and interconnecting the:
  - Ion source
  - Radio Frequency Quadrupole (RFQ) particle accelerator
  - Radio Frequency (RF) Power amplifier
  - Lithium Target Station



# RFQ Particle Accelerator

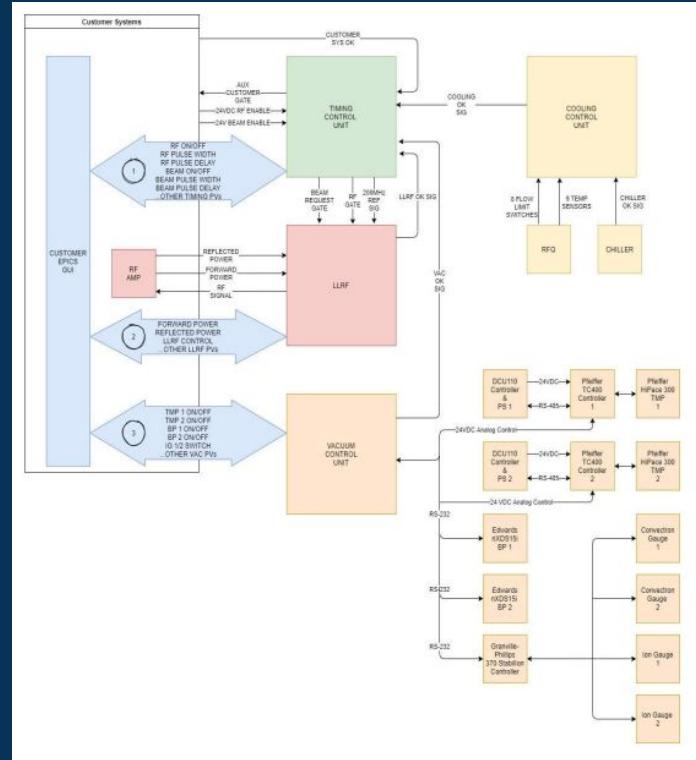
- The RFQ is the main component of the BNCT technology demonstrator.
  - The RFQ accelerates protons to an energy of 2,500,000 Volts
  - where the protons then hit a Lithium target to produce thermal neutrons for therapy
- The RFQ was manufactured by Time-Merit Co. Ltd from Hiroshima, Japan
  - Length: 3 meters
  - Weight: 4000 kg.
  - Copper purity > 99.99%,
  - machining precision: 30 um.





# RFQ Timeline

- The RFQ was to be installed in November 2021 but postponed to March 2022 due to Covid-19.
- In January 2022, the lead engineer for the Time-Merit RFQ left the company abruptly due to Covid-19
  - leaving no documentation for the the electronic controls (RF regulation, cooling, vacuum)
- Time-Merit was unable to find a suitable replacement.
- On March 1, 2022, we promised to redesign, build, install and test the complete RFQ control system
  - by 1 June 2022
  - We completed this task by 15-May-2022



# All open source



bl-mirrotron [github.com/bl-mirrotron](#)

Search or jump to... Pull requests Issues Codespaces Marketplace Explore

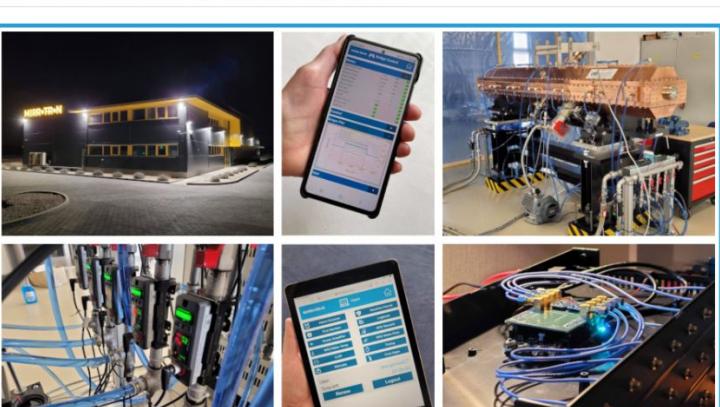
Follow

bl-mirrotron Hungary

Overview Repositories 26 Projects Packages Teams People 3 Settings

README.md

## The Mirrotron RFQ Control System



View as: Public You are viewing the README and repositories as a public user.

Get started with tasks that most successful organizations complete.

### People



Invite someone

### Top languages

HTML C++ JavaScript C

The Mirrotron Radio Frequency Quadrupole (RFQ) is part of a compact neutron source that is being built in Martonvásár Hungary. The compact neutron source consists of five major systems

The screenshot shows a GitHub organization page for 'bl-mirrortron'. The page lists 21 repositories, all of which are private. The repositories are:

- github
- bl-mirrortron.github.io
- mirrortron
- mirrortron-ck-temp-tray
- rx025-tactic-pump-tray
- mirrortron-cfg-vacuum-cube
- mirrortron-cfg-vacuum-tray
- mirrortron-user-guide
- mirrortron-cfg-flow-tray-outlet
- mirrortron-cfg-flow-tray-inlet
- mirrortron-cfg-temp-tray-outlet
- mirrortron-cfg-temp-tray-inlet
- mirrortron-cfg-flow-cube
- mirrortron-cfg-temp-cube
- mirrortron-cfg-scope-tray
- mirrortron-airflow-scope-tray
- mirrortron-airflow-tray
- mirrortron-cfg-trace-cube
- gated125-key
- mirrortron-phaser-detectr-tray
- mirrortron-cfg-crt-tray
- mirrortron-cfg-diming-tray
- mirrortron-cfg-temp-tray
- mirrortron-cfg-flow-tray
- mirrortron-ck-temp-tray
- mirrortron-ck-flow-tray
- mirrortron-ck-flow-tray
- mirrortron-ck-gpu-tilt-tray



# Mirrotron Applications

M Apps

bl-mirrotron.com/apps

## MIRR•TR•N Apps

Bridge Control

- Alarm Scanner
- Machine Permit
- Post Mortem
- Logbook
- Power Amplifier
- RFQ Vacuum
- RFQ Water Temp
- RFQ Water Flow
- LLRF
- Timing
- Manuals
- Core Apps

User: dmcginnis427

Time left: 07:51:53

[Renew](#) [Logout](#)





# Dashboard Application

The image displays two screenshots of a dashboard application interface, likely for a particle accelerator control system, running in a web browser.

**Left Screenshot (Bridge Control):**

- Status:**

Parameter	Value	Unit	Control
Requested Power	110	kW	Green
Forward Power	100.32	kW	Green
Reverse Power	1.569	kW	Green
Cavity Voltage	3.495	kV	Green
Cavity Phase	42	deg	Green
Pulse Length	1000	uS	Green
Rep. Rate	2	Hz	Green
Duty Factor	0.202	%	Green
Permit			Green
Power Amp On			Green
RF Power On			Green
LLRF On			Green
- Control:**

Parameter	Value	Unit	Control
Requested Power	110	kW	Green
Rep. Rate	2	Hz	Green
Pulse Length	1000	uS	Green
LLRF On	On		Green
Phase Lock On	On		Green
Power Amp On	On		Green
RF Power On	On		Green
- Scope Plot:** A dual-axis plot showing signal voltage (kV) and power (kW) over time (uS). The x-axis ranges from 1000 to 2500 uS. The y-axis has two scales: 0 to 250 kV on the left and 0 to 250 kW on the right. Four traces are shown:
  - Blue line: lrf-scope.01.mVec
  - Blue line: lrf-scope.01.vVec
  - Yellow line: rfpower-scope.01.mVec
  - Yellow line: rfpower-scope.01.vVecThe plot shows a sharp rise in both signals around 1500 uS, followed by a drop at approximately 2000 uS.

**Right Screenshot (Bridge Control):**

- Status:** A table showing current values for various parameters:

Parameter	Value
Forward Power	LOLO
Reverse Power	LOW
Cavity Voltage	HIGH
Pulse Length	38
Rep. Rate	HIHI
Duty Factor	39
Permit	
Power Amp On	
RF Power On	
LLRF On	
- Control:** A modal dialog box titled "gateGen125.01.repRate" with "Set" and "Cancel" buttons. It contains fields for setting values:

Parameter	Value
Name	
Phone	
- Scope Plot:** A simplified version of the scope plot from the left screenshot, showing the same four traces and a similar time scale (1000 to 2500 uS).
- Control:** A table showing control settings:

Parameter	Value	Unit	Control
Requested Power	110	kW	Green
Rep. Rate	1.3	Hz	Magenta
Pulse Length	1000	uS	Green
LLRF On	Off		Red
Phase Lock On	On		Green
Power Amp On	On		Green
RF Power On	On		Green

# Machine Permit and Alarm Scanner



M Machine Permit    M LLRF

bl-mirrotron.com/app07?trayNames=01

## MIRR•TR•N Machine Permit

### Status

Watchdog	26630	Green
Permit	Permit	Red

### Systems

rfq-temp.inlet	OK	Green
rfq-temp.outlet	OK	Green
rfq-flow.inlet	OK	Green
rfq-flow.outlet	OK	Green
scroll-pump.01	OK	Green
scroll-pump.02	OK	Green
rfq-vacuum	OK	Green
rf-src	OK	Green
timing	Permit	Red

### User

+

M Alarm Scanner    M LLRF

bl-mirrotron.com/alarmScanner

## MIRR•TR•N Alarm Scanner

### Alarms

Cube	Value	Unit	Alarm
rk-pa.01.warningCode	9095		Red
gateGen125.01.repRate	1.2	Hz	Pink
gateGen125.01.permit	0		Pink
machine-permit.01.permit	0		Pink
machine-permit.01.gateGen125/01	1		Pink

### Warnings

Cube	Value	Unit	Warning
dmcginnis427			

User: dmcginnis427  
Time left: 04:48:54

Renew    Logout

# Post Mortem Application



M Post-Mortem    M LLRF

bl-mirrotron.com/postMortem

**MIRR•TRON**  Post-Mortem 

**Abort List**

Date	Action
22-07-28 09:48	Display
22-07-28 09:47	Display
22-07-28 09:46	Display
22-07-28 09:40	Display
22-07-26 14:31	Display

User: dmcginnis427  
Time left: 04:46:16

**Renew** **Logout**

M Post-Mortem    M LLRF

bl-mirrotron.com/postMortem

**MIRR•TRON**  Post-Mortem 

**Abort List**

Date	Action
22-07-28 09:48	Display
22-07-28 09:47	Display
22-07-28 09:46	Display
22-07-28 09:40	Display
22-07-26 14:31	Display

**Alarm List - 22-07-28 09:48**

Cube	Value	Unit	Alarm
gateGen125.01.repRate	1.2	Hz	
gateGen125.01.permit	0		

User: dmcginnis427  
Time left: 04:44:33

**Renew** **Logout**

# Logbook Application



**MIRR•TR•N LogBook**

**Entries**

Date	Author	Title	Action
22-07-28 09:58	dmcginnis427	System Testing for documentation	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-28 10:59	pajos	Bridge control app test	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-26 09:44	dmcginnis427	Data pooling added to control system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 12:11	dmcginnis427	Analysis of RFQ tutorial session	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 10:20	pajos	RFQ tutorial	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:50	dmcginnis427	Scalar Alarm App upgraded	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem app	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem State Broadcast on all trays	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:46	dmcginnis427	Timing system added to the machine permit system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:42	dmcginnis427	Duty factor and beam pulse length added	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:39	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 18:20	dmcginnis427	Entry	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 17:32	dmcginnis427	Date: 22-07-26 09:44 Author: dmcginnis427 Title: Data pooling added to control system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 19:55	dmcginnis427	During the RF tests of 22-07-17, the performance of the Bridge Control app suffered when multiple users accessed the app simultaneously. The Bridge Control app uses data from 8 separate trays, rf-src, phase-detector, lrf-scope, gateGen125, rfpower-scope, rk-pa, machine-permit, easySetupTimer in which lrf-scope and rf-power-scope are vector devices. To alleviate the multiple requests to the database, the apps are now connected directly to the MQTT broker and the each app has its own	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:46	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:38	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:52	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:10	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:08	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-10 08:58	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>

User: dmcginnis427

Time left: 04:40:42

[Renew](#) [Logout](#)

**Entries**

Date	Author	Title	Action
22-07-28 09:58	dmcginnis427	System Testing for documentation	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-26 13:59	pajos	Bridge control app test	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-26 09:44	dmcginnis427	Data pooling added to control system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 12:11	dmcginnis427	Analysis of RFQ tutorial session	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 10:20	pajos	RFQ tutorial	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:50	dmcginnis427	Scalar Alarm App upgraded	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem app	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem State Broadcast on all trays	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:46	dmcginnis427	Timing system added to the machine permit system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:42	dmcginnis427	Duty factor and beam pulse length added	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:39	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 18:20	dmcginnis427	Entry	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 17:32	dmcginnis427	Date: 22-07-26 09:44 Author: dmcginnis427 Title: Bridge control app test - New info!	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 15:55	dmcginnis427	Title: Bridge control app test - New info!  Text: It went well. Turning on LLRF, Amplifier with RF power through the app from the office	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:46	dmcginnis427	Ramping it up to 190kW from 110kW.	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:38	dmcginnis427	Ramp it down and shot down the amplifier	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 08:52	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:10	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:08	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-10 08:58	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>

User: dmcginnis427

Time left: 04:38:26

[Update](#) [Cancel](#) [Renew](#) [Logout](#)

**Entries**

Date	Author	Title	Action
22-07-28 09:58	dmcginnis427	System Testing for documentation	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-26 13:59	pajos	Bridge control app test	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-26 09:44	dmcginnis427	Data pooling added to control system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 12:11	dmcginnis427	Analysis of RFQ tutorial session	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-19 10:20	pajos	RFQ tutorial	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:50	dmcginnis427	Scalar Alarm App upgraded	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem app	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-17 18:48	dmcginnis427	Added Post-Mortem State Broadcast on all trays	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:46	dmcginnis427	Timing system added to the machine permit system	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:42	dmcginnis427	Duty factor and beam pulse length added	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-15 10:39	dmcginnis427	EasySetupTimer Tray added	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 18:20	dmcginnis427	Average to scope sample and holds	<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 17:32	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 15:55	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:46	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 09:38	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-14 08:52	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:10	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-11 11:08	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>
22-07-10 08:58	dmcginnis427		<a href="#">Display</a> <a href="#">Edit</a> <a href="#">Delete</a>

User: dmcginnis427

Time left: 04:37:51

[Error](#)  
You are not the author.

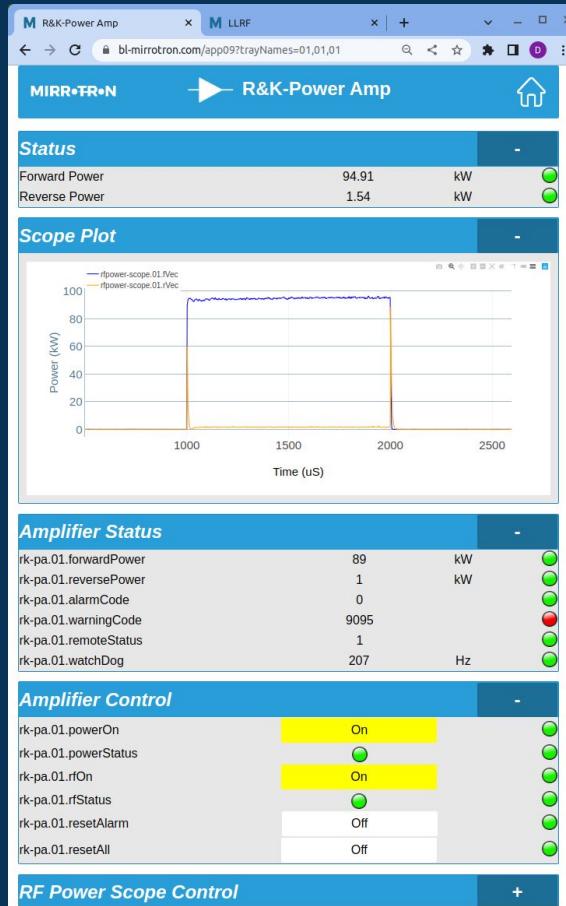
[Renew](#) [Logout](#)

# RF Power Amplifier



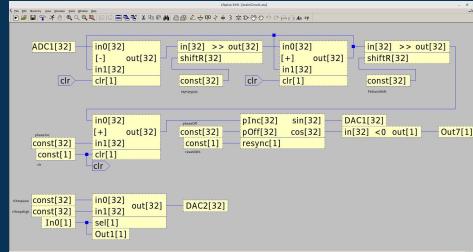
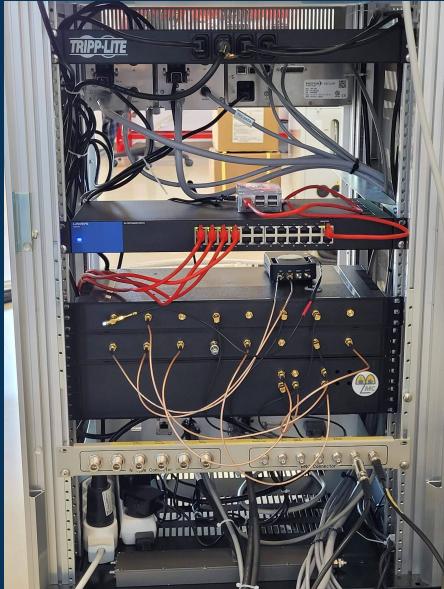
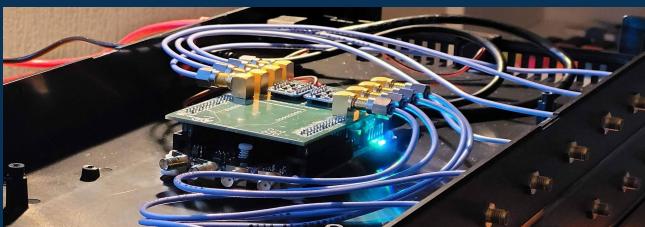
1.3 M€, solid state RF power amplifier (SSA) to Blinky-Lite.

- The amplifier consists of 84 power transistors with 12 independent parameters for a total of 1008 devices
- The amplifier provides 300kW @200MHz
- Modbus TCP interface





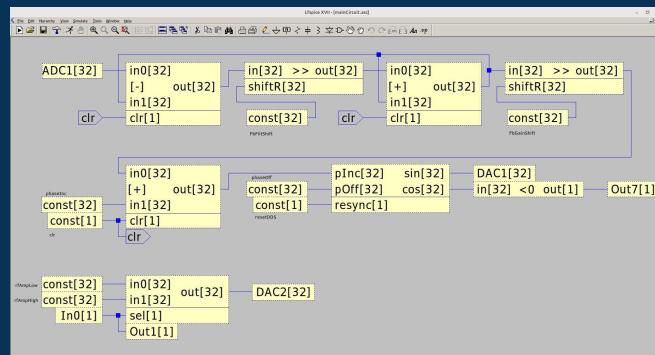
# RFQ RF Regulation



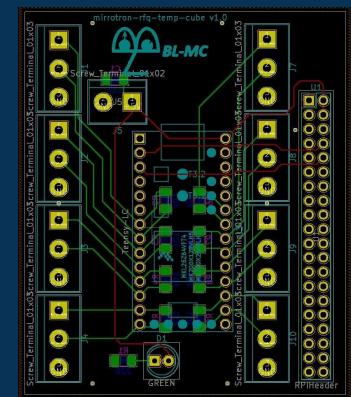
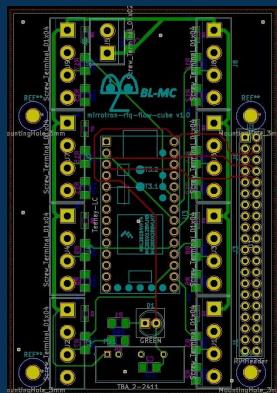
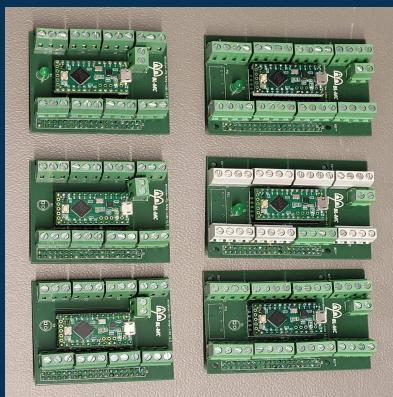
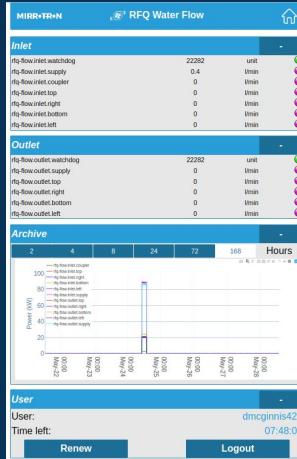
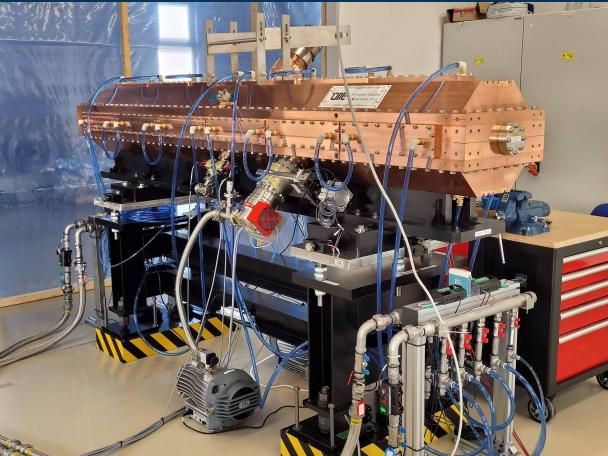
# Blinky-Lite DSP Technology



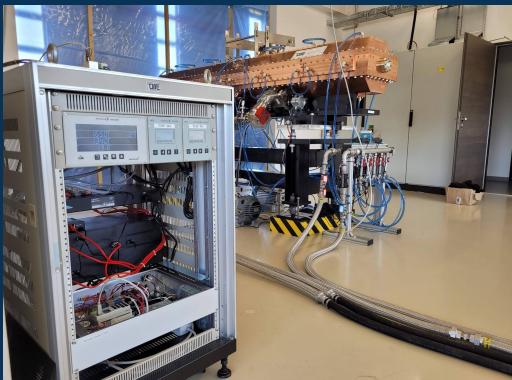
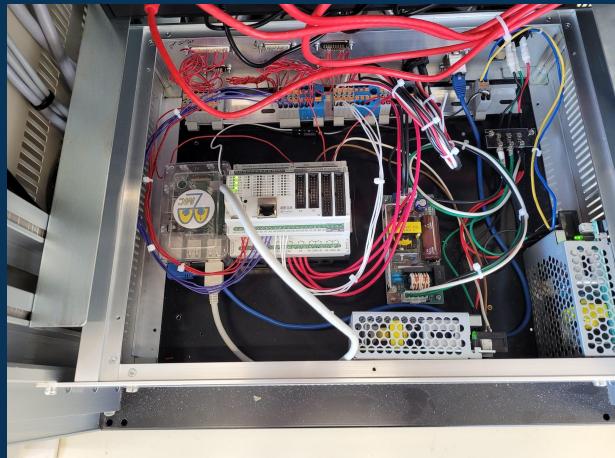
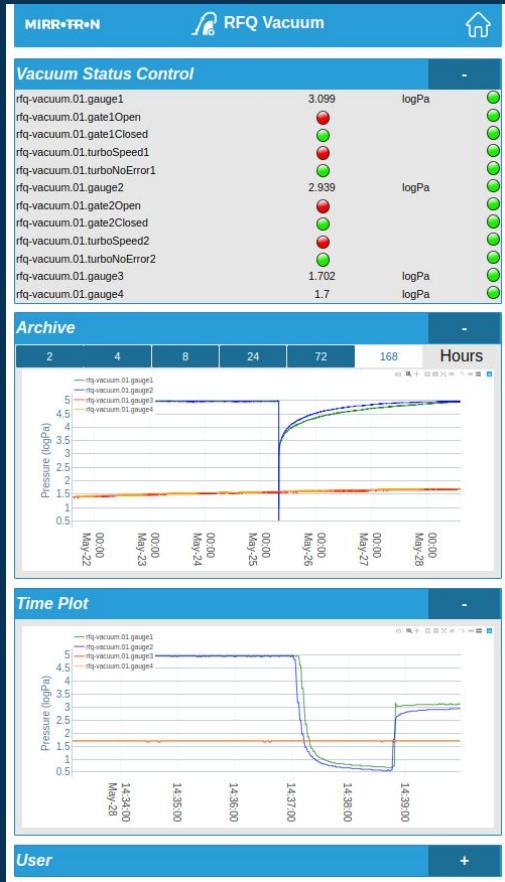
- The fractional bandwidth of the RFQ is 0.0001
  - so the RF frequency to the RFQ must be controlled to 1 part in 1 million
  - as the cavity warms up and down though 300kW of power cycles.
- To control with this precision, we implemented a direct digital synthesizer
  - on a Xilinx Zync 7010 SOC FPGA on the Red Pitaya Stemlab 125-14
  - and then directly mounted a Blinky-Lite tray to the SOC memory giving real time control of the RF system through Blinky-Lite
- This presents a whole new world of possibilities for digital signal processing with secure web control!



# RFQ Cooling



# RFQ Vacuum





# Core Applications

M Core Applications x M LLRF x | + v - □ ×

← → C 🔒 bl-mirrotron.com/core

MIRR•TR•N Core Applications

Access Log Settings Log

Scalar Plotter Scalar Archive Plotter

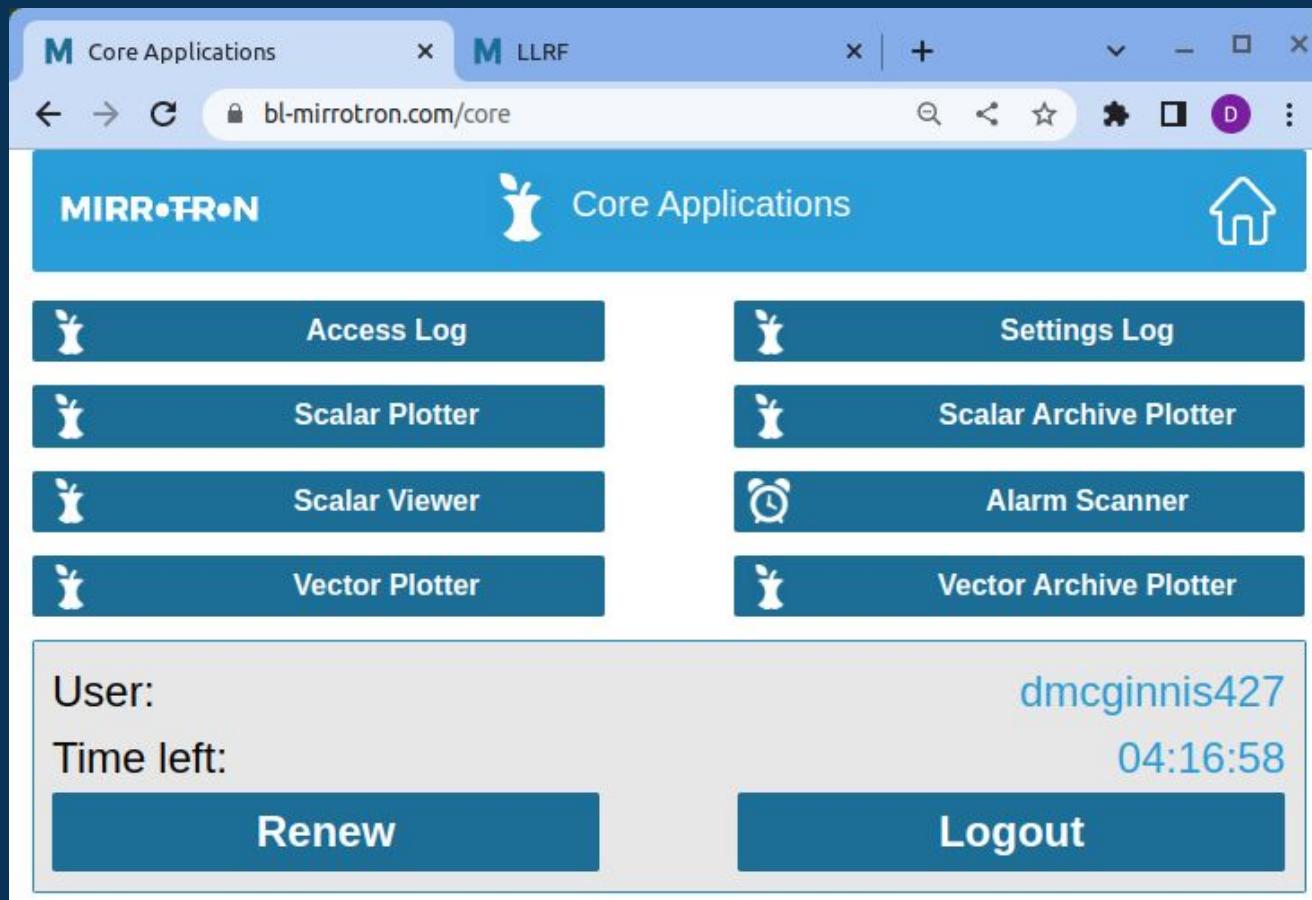
Scalar Viewer Alarm Scanner

Vector Plotter Vector Archive Plotter

User: dmcginnis427

Time left: 04:16:58

Renew Logout

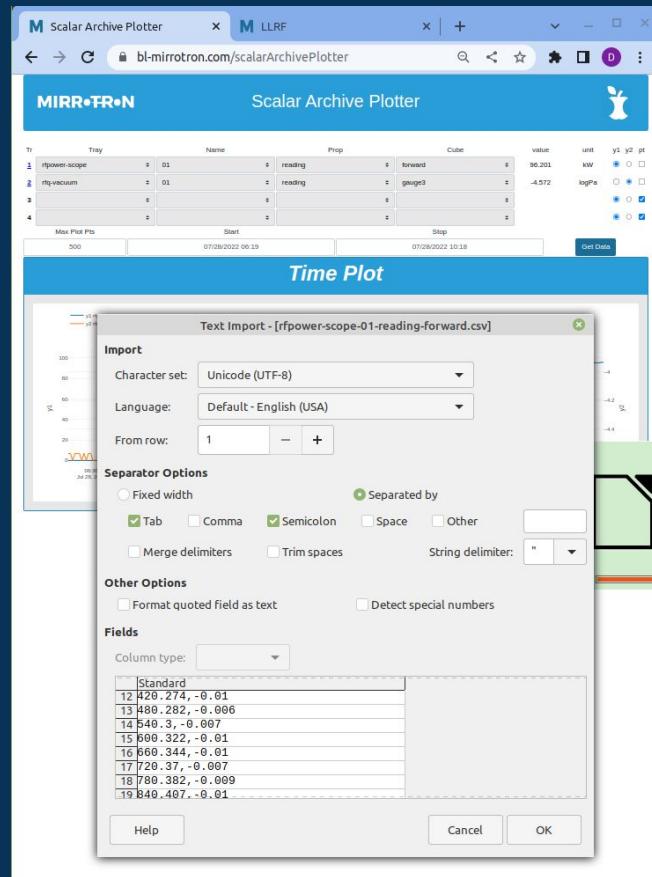
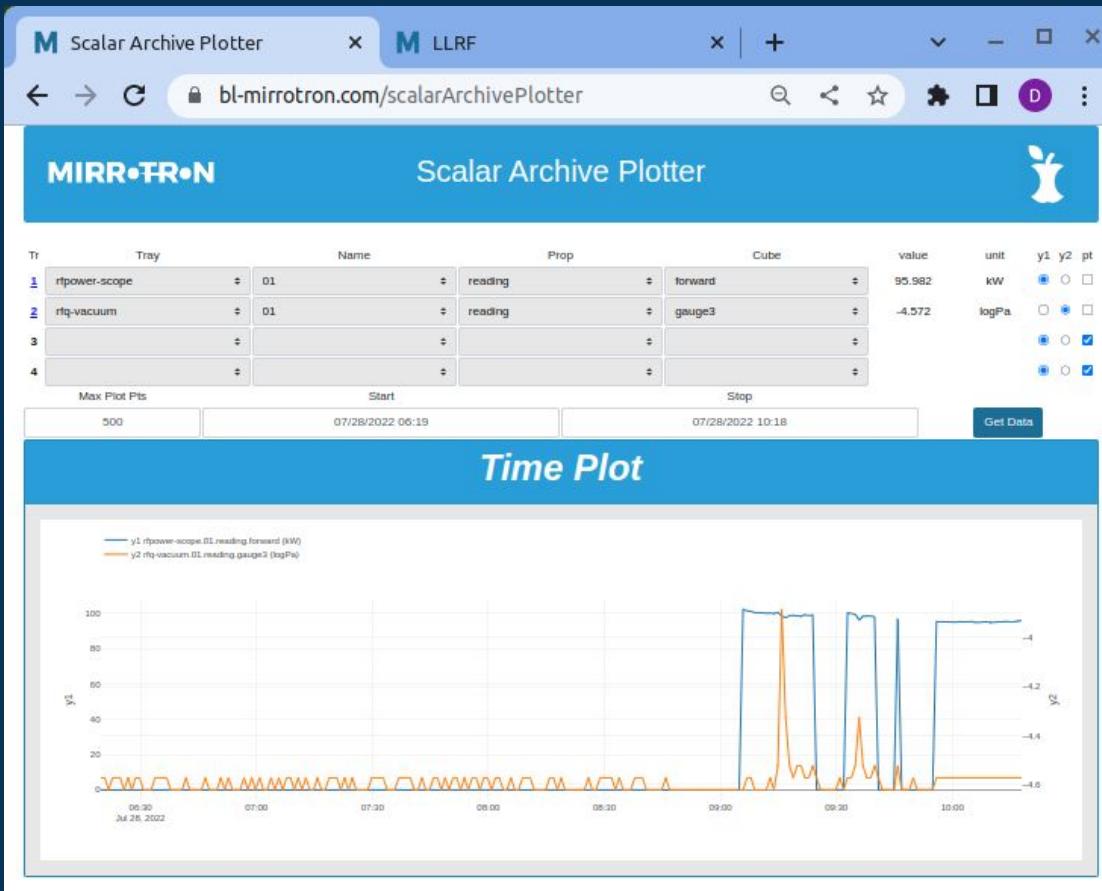


# Access and Settings Log



M Access Log		M LLRF			
<a href="#">←</a>	<a href="#">→</a>	<a href="#">C</a>	<a href="#">bl-mirrotron.com/access-log</a>	<a href="#">🔍</a>	<a href="#">✖</a>
<b>MIRR•TRON</b> Access Log					
					
Start Date	Stop Date	Get Data		Ip	Date
07/27/2022 10:10	07/28/2022 10:10	Get Data		ip	Time
url	ip	user	city	rdns	
/app05/trayNames=None	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:15:38 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:15:29 AM
/app08/trayNames=@01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:13:21 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:13:18 AM
/app03/trayNames=@01_01.01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:12:01 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:11:50 AM
/app09/trayNames=@01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:11:32 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:11:29 AM
/app02/trayNames=@net.outlet	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:10:18 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:10:15 AM
/app01/trayNames=@net.outlet	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:09:13 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:09:06 AM
/app04/trayNames=@01_01_02	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:06:42 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:06:39 AM
/app09/trayNames=@01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:05:30 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 10:03:23 AM
/logbook	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:55:33 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:55:43 AM
/app08/	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:55:16 AM
trayNames=@01_01_01_01_01_01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:55:13 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:52:40 AM
/postMortem	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:52:37 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:51:18 AM
/app08/	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:51:18 AM
trayNames=@01_01_01_01_01_01_01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:51:15 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:49:50 AM
/alarmScanner	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:49:47 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:49:00 AM
/app07/trayNames=@01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:48:58 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:48:57 AM
/app08/	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:47:24 AM
trayNames=@01_01_01_01_01_01_01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:47:18 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:47:06 AM
/app08/	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:44:14 AM
trayNames=@01_01_01_01_01_01_01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:35:24 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:35:18 AM
/postMortem	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:35:14 AM
/apps	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:27:08 AM
/app09/trayNames=@01_01_01	2.70.82.178	dmcgrinis427	Stockholm	2.70.82.178.mobile.tre.se	H3G Access AB 7/28/2022 9:27:08 AM

# Archive Plotters and Export



# RFQ Online Documentation



M RFQ Manuals

bl-mirrotron.co... RFQ Manuals

Vacuum System Startup +

Vacuum System Shutdown +

Cooling System Startup -

Procedure 5

Start up the chiller No.1 and No.2.

 Push RUN/STOP button.

 Press and hold 3 seconds RUN/STOP button.

The RUN indicator lights up when the chiller is activated. 

Cooling System Shutdown +

Cooling System Maintenance +

LLRF and Timing System +

User +

M RFQ Manuals

bl-mirrotron.co... RFQ Manuals

VACUUM SYSTEM

**Vacuum System Startup**

**Vacuum System Shutdown**

**Cooling System Startup**

Procedure 6

Check the leak.  
If you find a leak, turn off the chiller immediately.

Turn off the chiller



Press and hold 3 seconds  
RUN/STOP button.

**Cooling System Shutdown**

**Cooling System Maintenance**

**LLRF and Timing System**

**User**

M RFQ Manuals

bl-mirrotron.co... RFQ Manuals

VACUUM SYSTEM

**Vacuum System Startup**

**Vacuum System Shutdown**

**Cooling System Startup**

**Cooling System Shutdown**

**Cooling System Maintenance**

Add the water

Procedure 5

Add the Contolime K6300

You have to add sodiumhypochlorite agent  
(Contolime K6300)  
(コントライム K8300)  
1,500mg / L

The amount to add is 1,500 mg per liter of water.

Be sure to add the Contolime K6300 when you supply water.  
If you don't add the Contolime K6300, the cavity will be damaged.

LLRF and Timing System

User