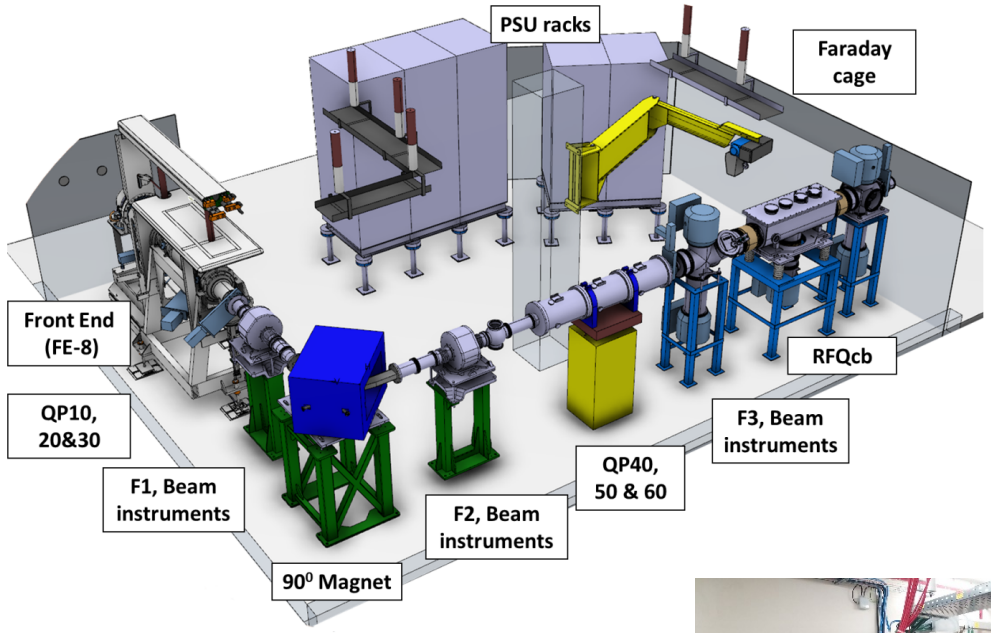
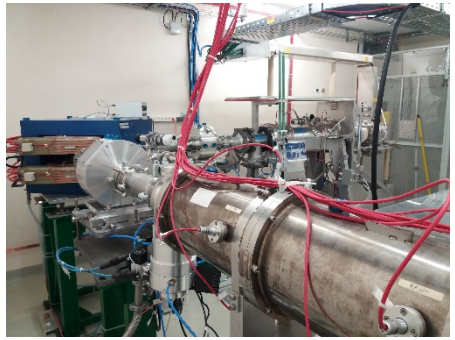
Offline-2,
Tapestation,
New Frontends,
...and everything

ISOLDE Off-line 2 isotope separator



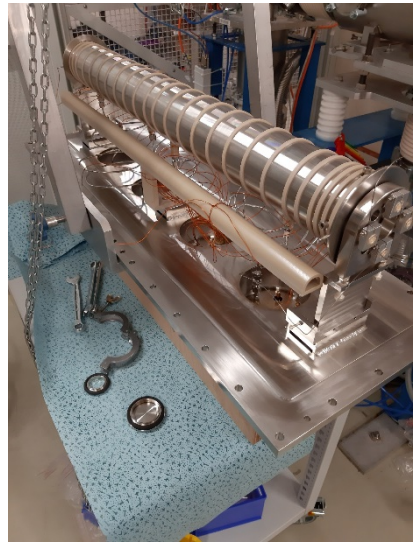
Off-line 2 construction completed:

- Vacuum system completed
- Gas handling system for targets installed
- Beam instrumentation tested and fully operative
- Interlocks for laser facility installed
- Magnet controls commissioned and tested
- Software for controls operative



RFQcb construction on-going:

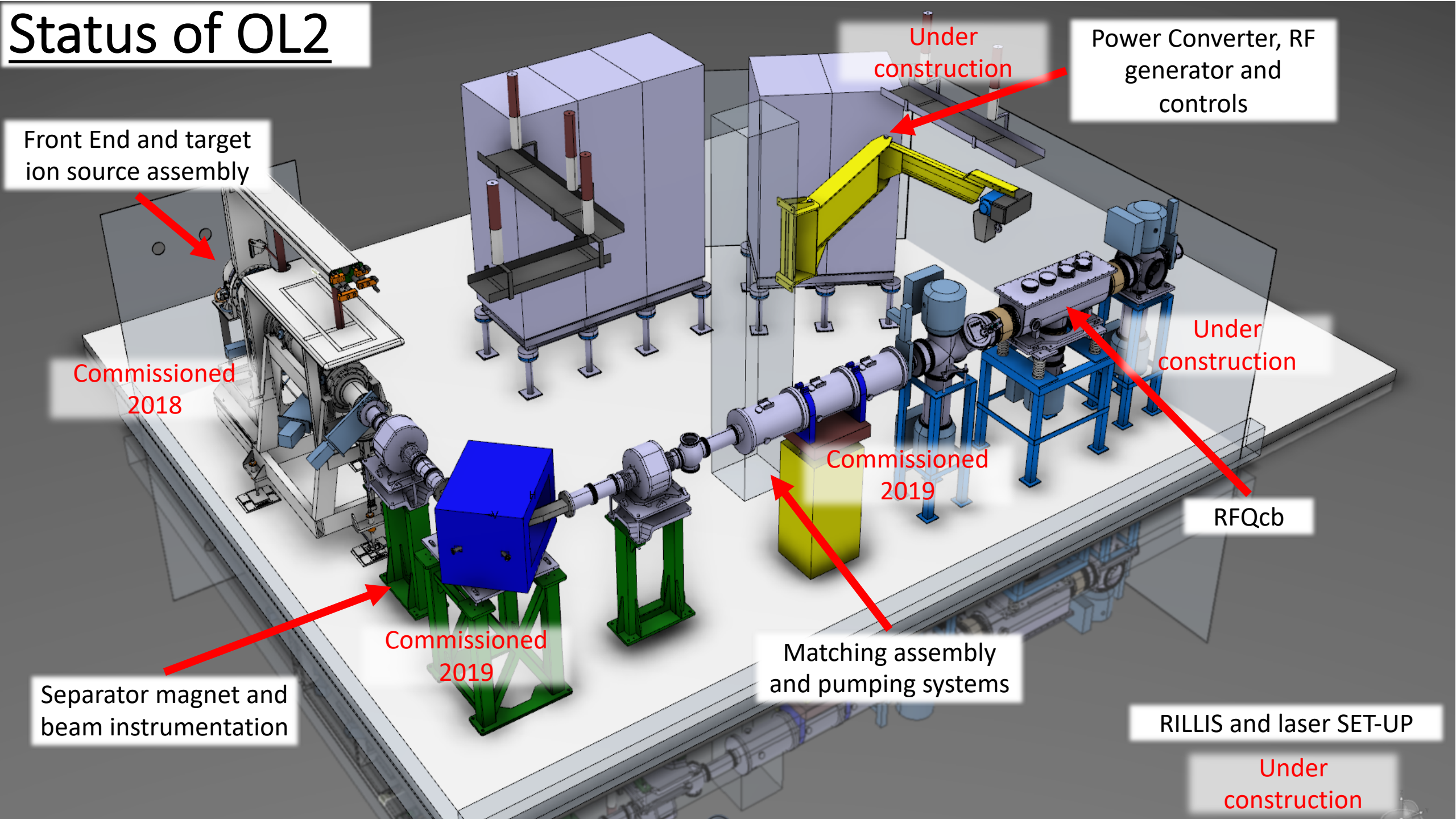
- Mechanical assembly completed using improved design
- LabVIEW controls under installation
- Insulation transformer and associated interlock installation under construction
- Cabling and network installation on-going
- RF supply system in construction

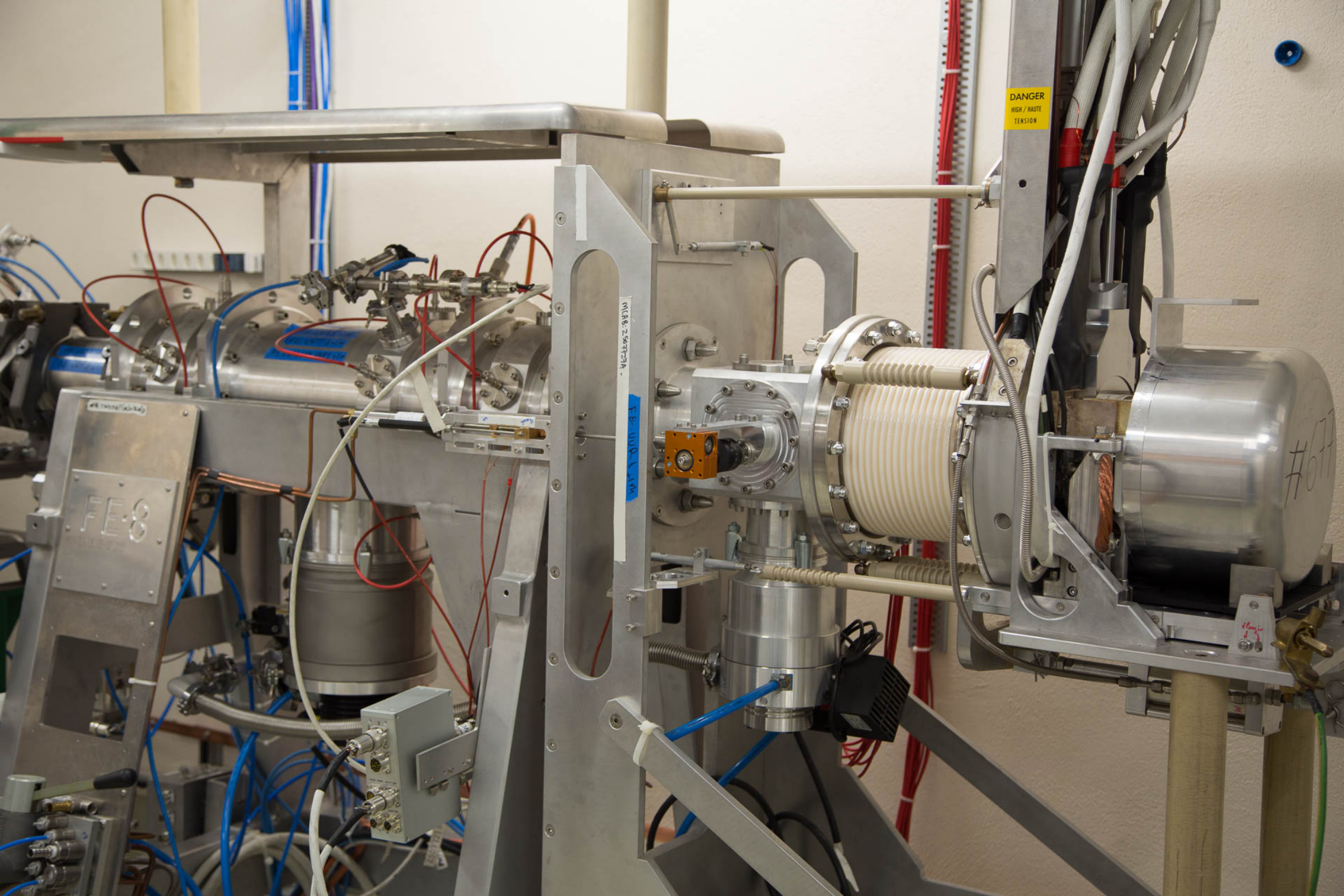


New beam section constructed for integration of new ToF detector in the beam line

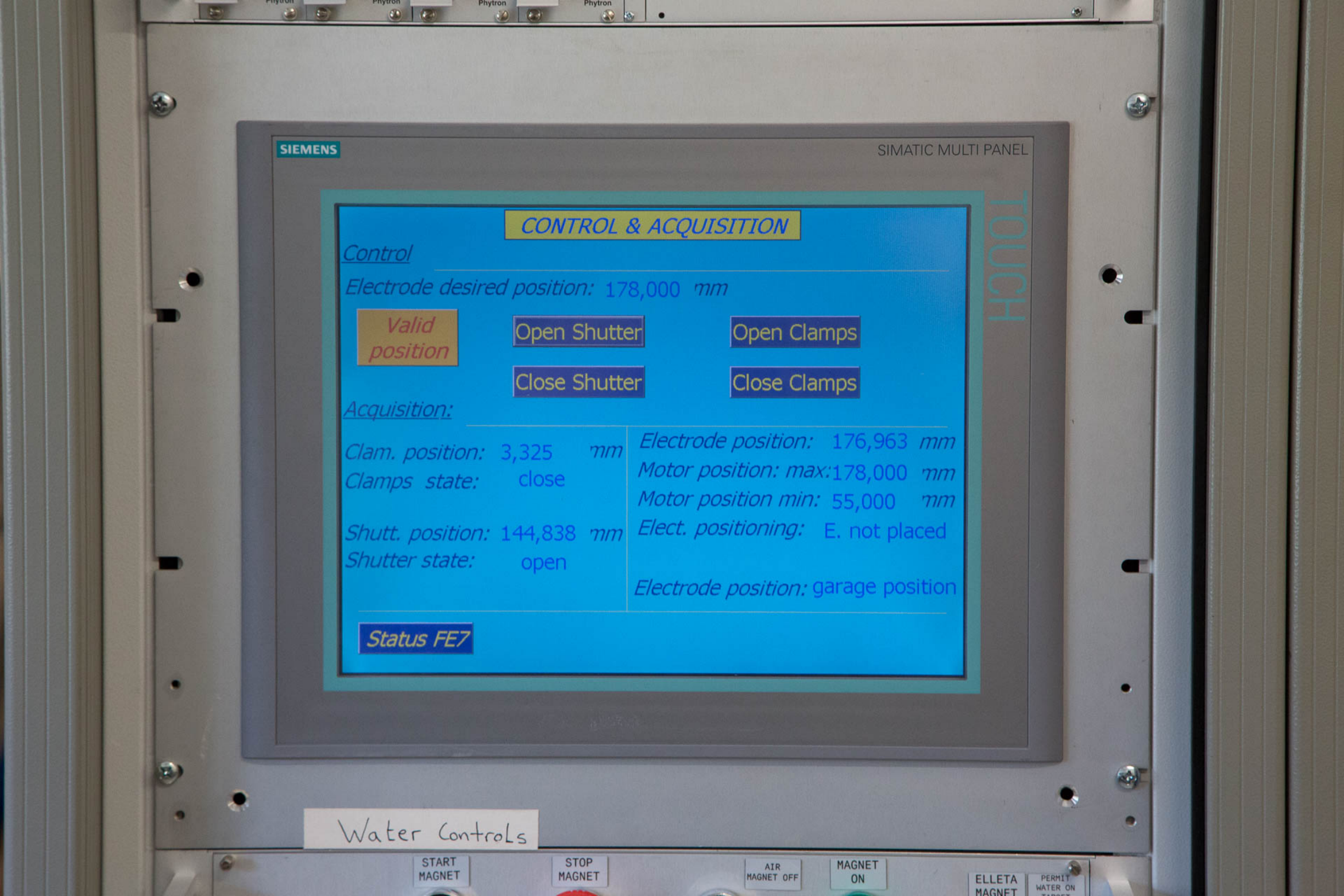
- Commissioning of remaining vacuum controls
- Possibility of further testing with the detector

Status of OL2



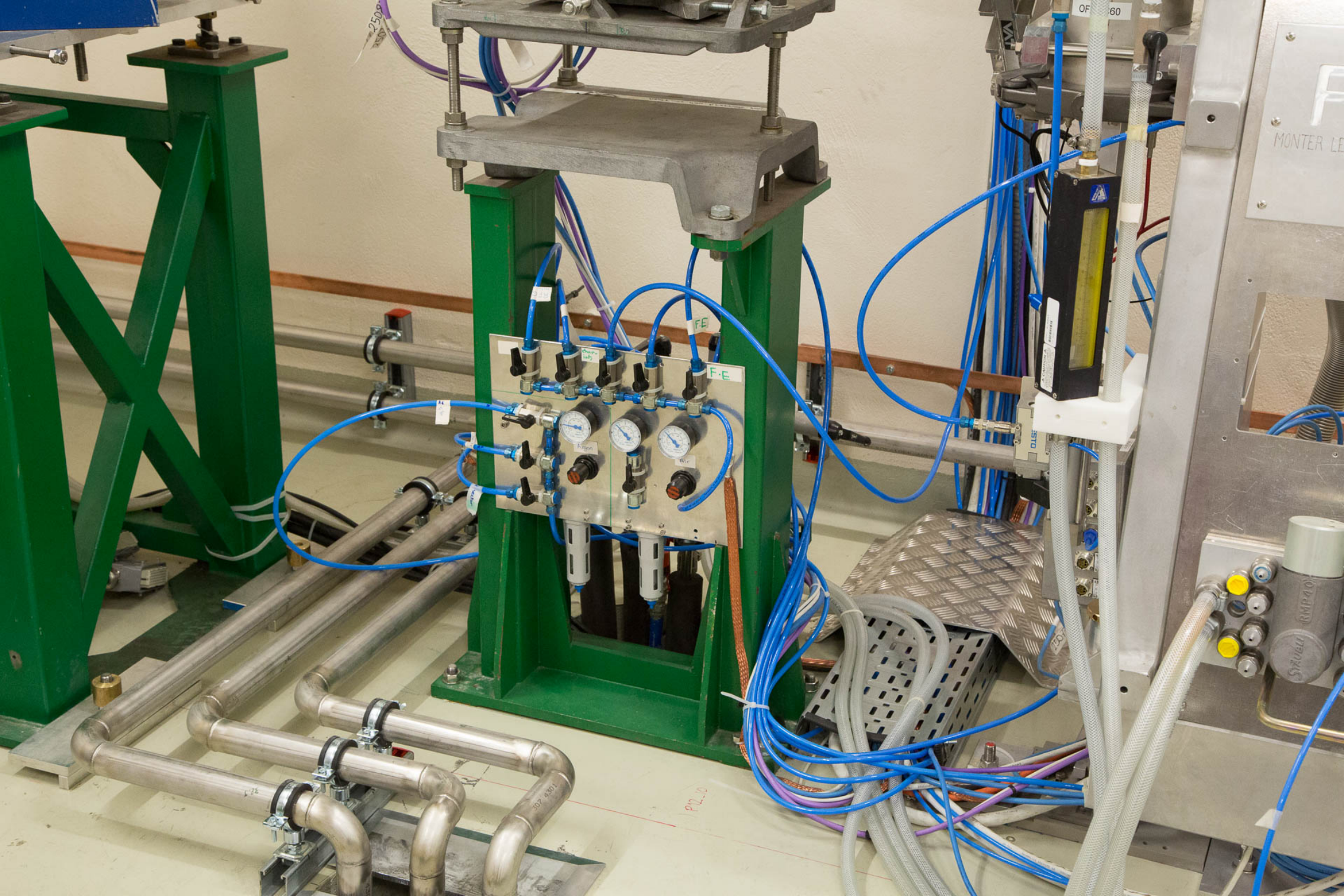

DANGER
HIGH / HAUTE
TENSION
FE-8


FE.UVR1+1M


SIEMENS
SIMATIC MULTI PANEL
TOUCH
CONTROL & ACQUISITION
Control
Electrode desired position: 178,000 mm
Valid position
Open Shutter
Close Shutter
Open Clamps
Close Clamps
Acquisition:
Clam. position: 3,325 mm
Clamps state: close
Shutt. position: 144,838 mm
Shutter state: open
Electrode position: 176,963 mm
Motor position: max: 178,000 mm
Motor position min: 55,000 mm
Elect. positioning: E. not placed
Electrode position: garage position
Status FE7
Water Controls
START MAGNET
STOP MAGNET
AIR MAGNET OFF
MAGNET ON
ELLETA MAGNET
PERMIT WATER ON


TPG 300
PFEIFFER VACUUM
TPG 300
PFEIFFER VACUUM
TPG 300
PFEIFFER VACUUM
A1: FE_VGP1
A2: FE_VGR1
B1: SEP_VGP1
B2: SEP_VGR1
A1: RFQ_VGP1
A2: RFQ_VGR1
B1: VPPR_VGR1
B1: VPPR_VGR2
A1: EM_VGP1
A2: EM_VGR1
B2: VPPR_VGR3
CFP-26-VOFFLINE2
VED-160904
SIEMENS
SIMATIC S7-1500
FE_VPT1
FE_VPT2
SEP_VPT1
LOAD
SERVICE
STOP
START
Leybold
Turbo.Drive TD20 classic
VPPR1
VPPR2


PURGE


F.E
F.E


adixen
adixen
ACP 40
adixen


RP 8755

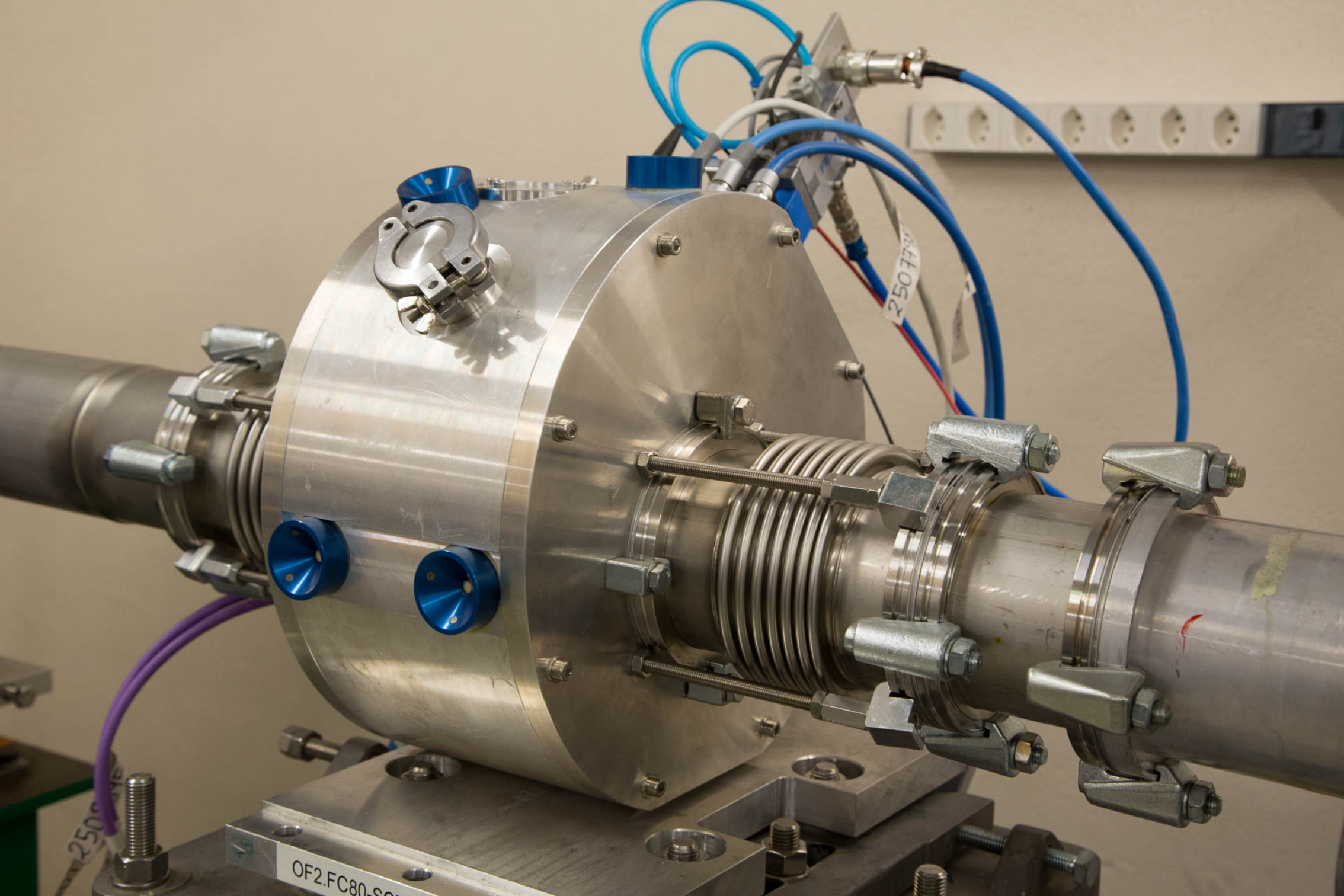

GRUNDFOS

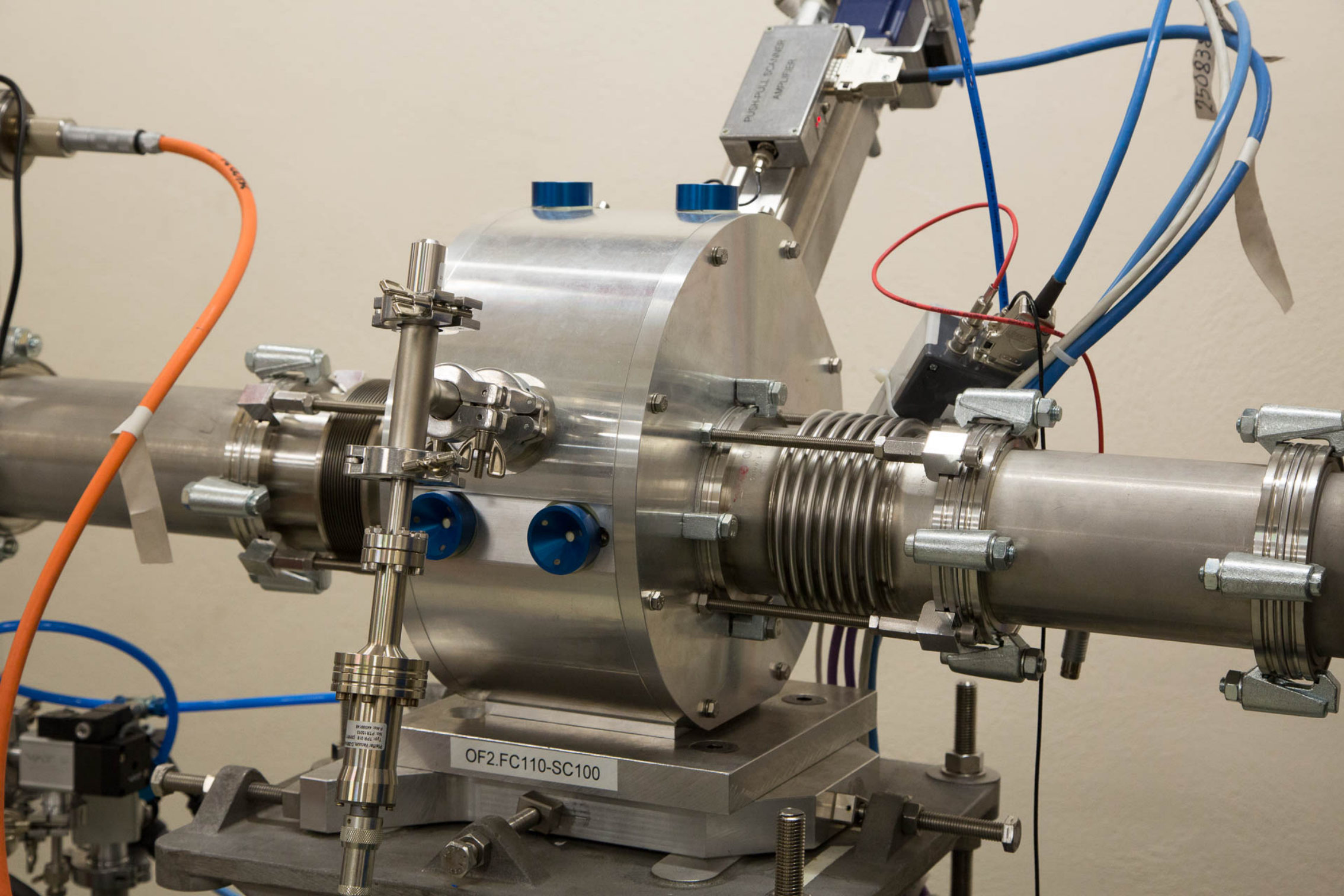

Water Controls
START MAGNET
STOP MAGNET
AIR MAGNET OFF
MAGNET ON
ELLETA MAGNET
PERMIT WATER ON TARGET
EMERGENCY
AIR MAGNET ON
AIR TARGET OFF
START TARGET
AIR TARGET ON
TARGET ON
ELLETA TARGET
PERMIT WATER OFF TARGET
TURBO START
TURBO STOP
TURBO AIR OFF
TURBO ON
TURBO ELETTA
WATER PERMIT ON TURBO & RF
EMERGENCY
TURBO AIR ON
RF AIR OFF
WATER PERMIT OFF TURBO & RF
RF START
RF AIR ON
RF ON
RF ELETTA
Remote


PATCH PANEL
POWER SUPPLY NEG.
ANODE 1
ANODE 2
SOURCE MAG
OVEN 1
OVEN 2
POWER SUPPLY POS.
ANODE 1
ANODE 2
SOURCE MAG
OVEN 1
OVEN 2
1
2
3
4
5
EARTH CONNECTIONS

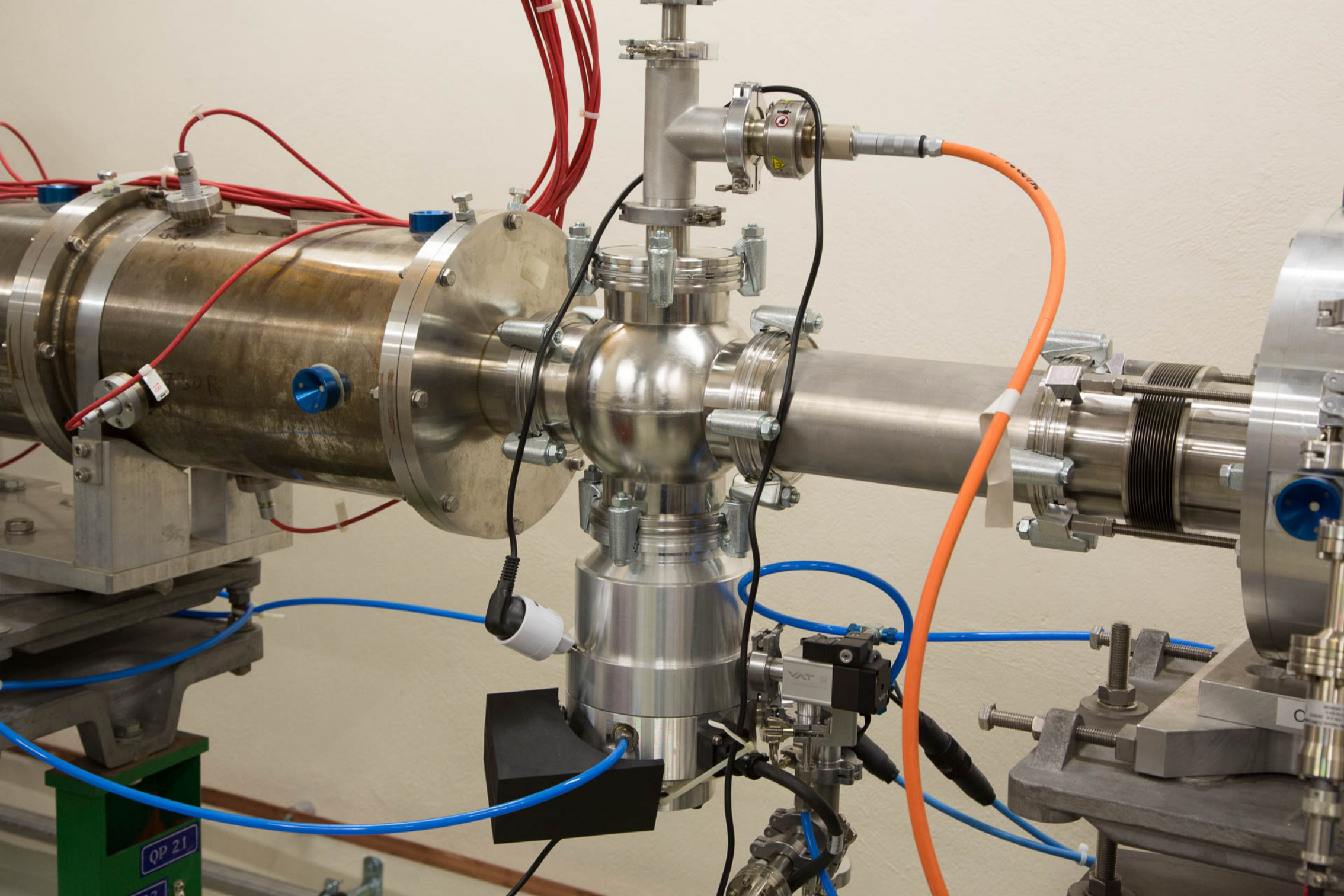

Agilent
IDP-7
Dry Scroll Pump

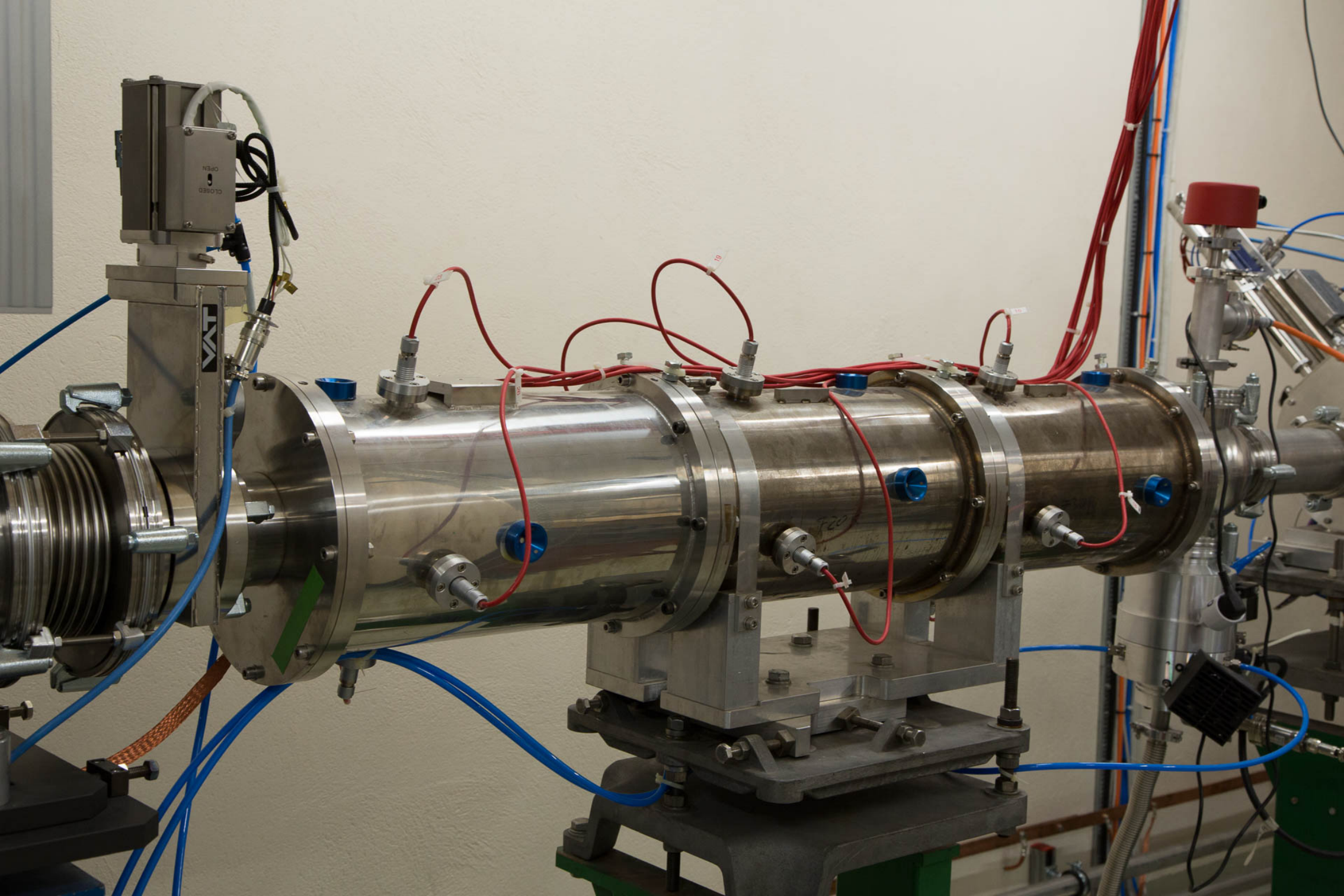

PAB07
PAB04

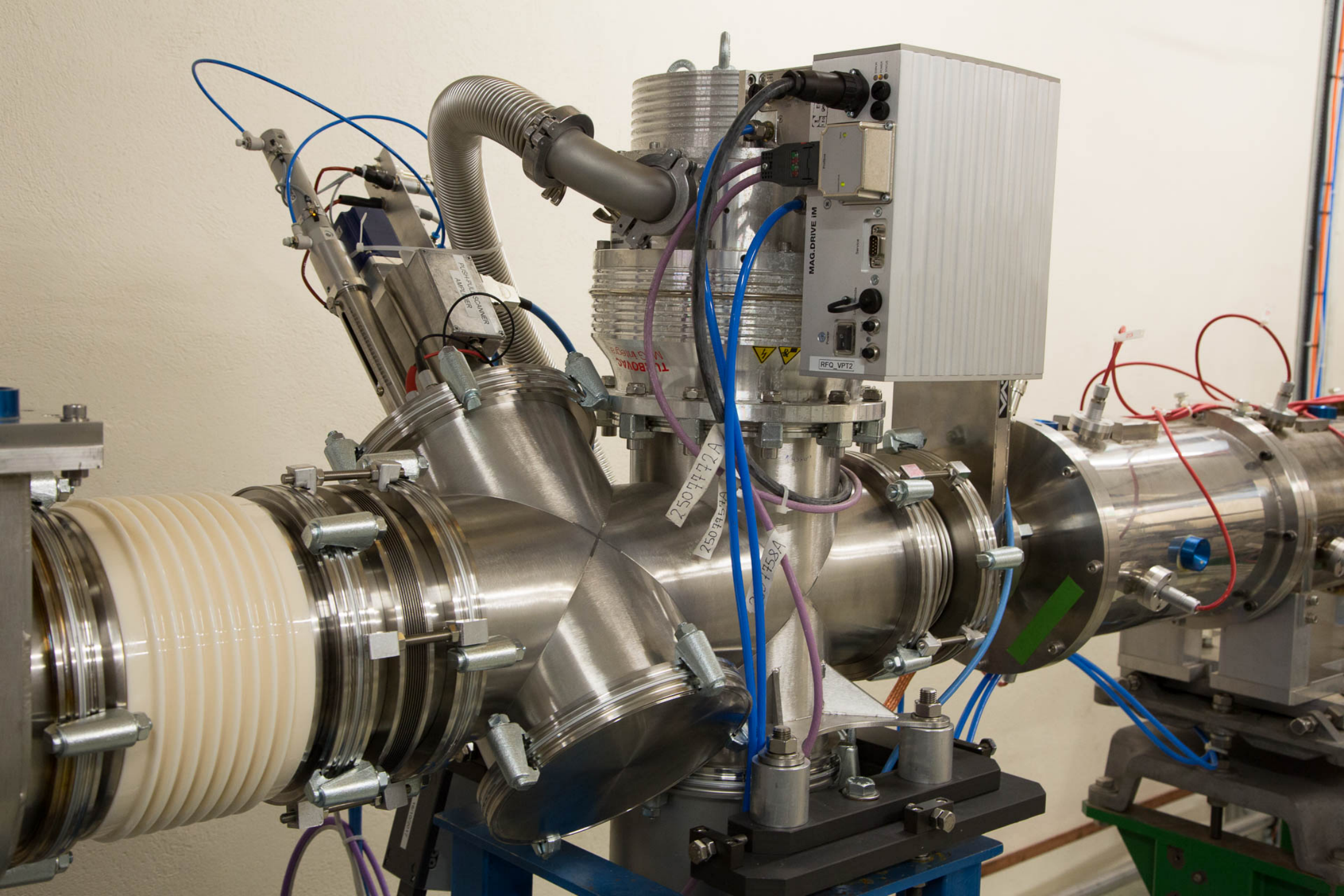

OF2.FC80-SC


PUSH-PULL SCANNER
AMPLIFIER
OF2.FC110-SC100

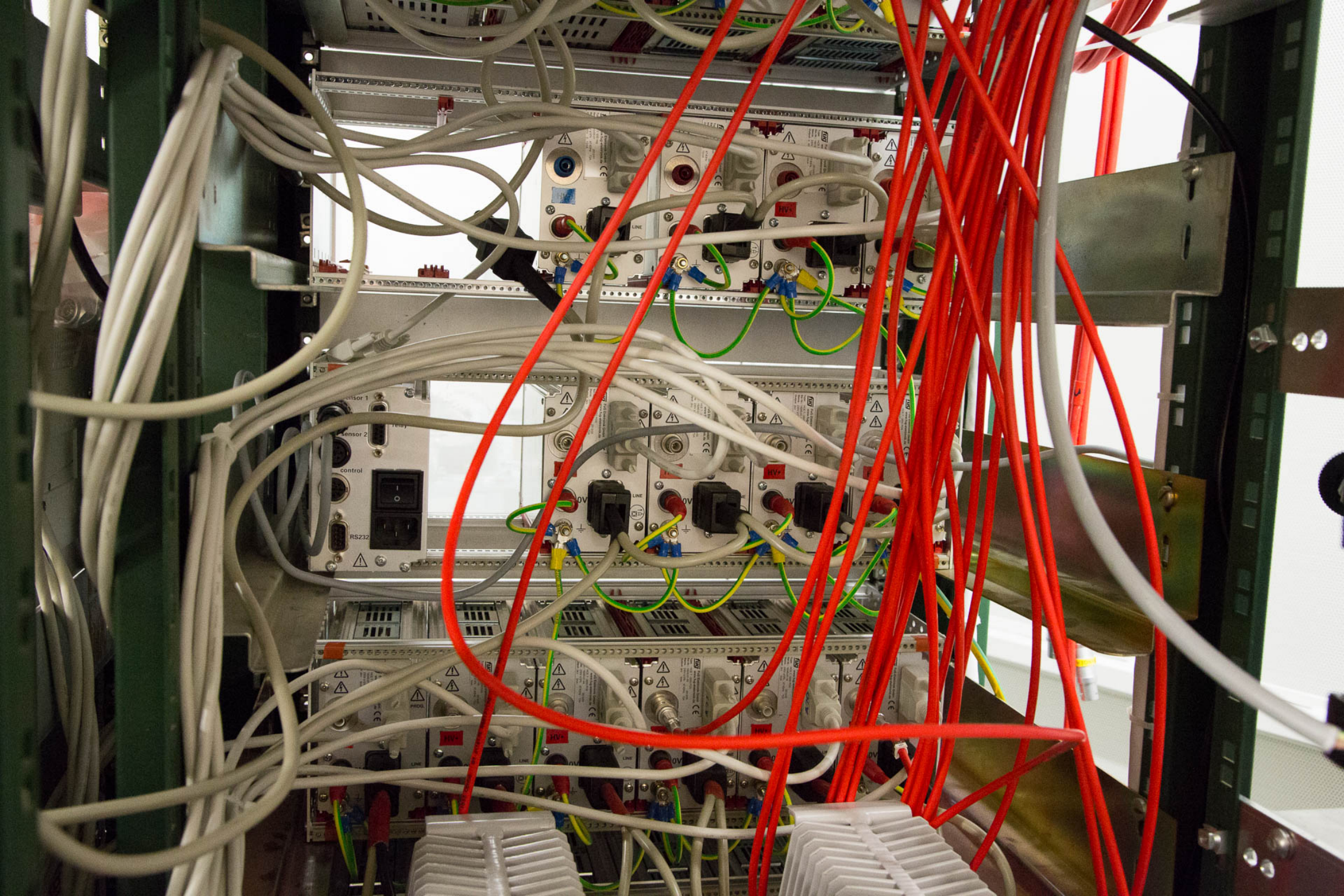

RA4
CFV-26-BSOFFL2
Scanner External Chassis
SC70
SC100
SC170
OFFL1-SC330
SINCOS
SINCOS
SINCOS
SINCOS
OFFLINE2
FARADAY-CUP
SIEMENS
SIMATIC S7-1500

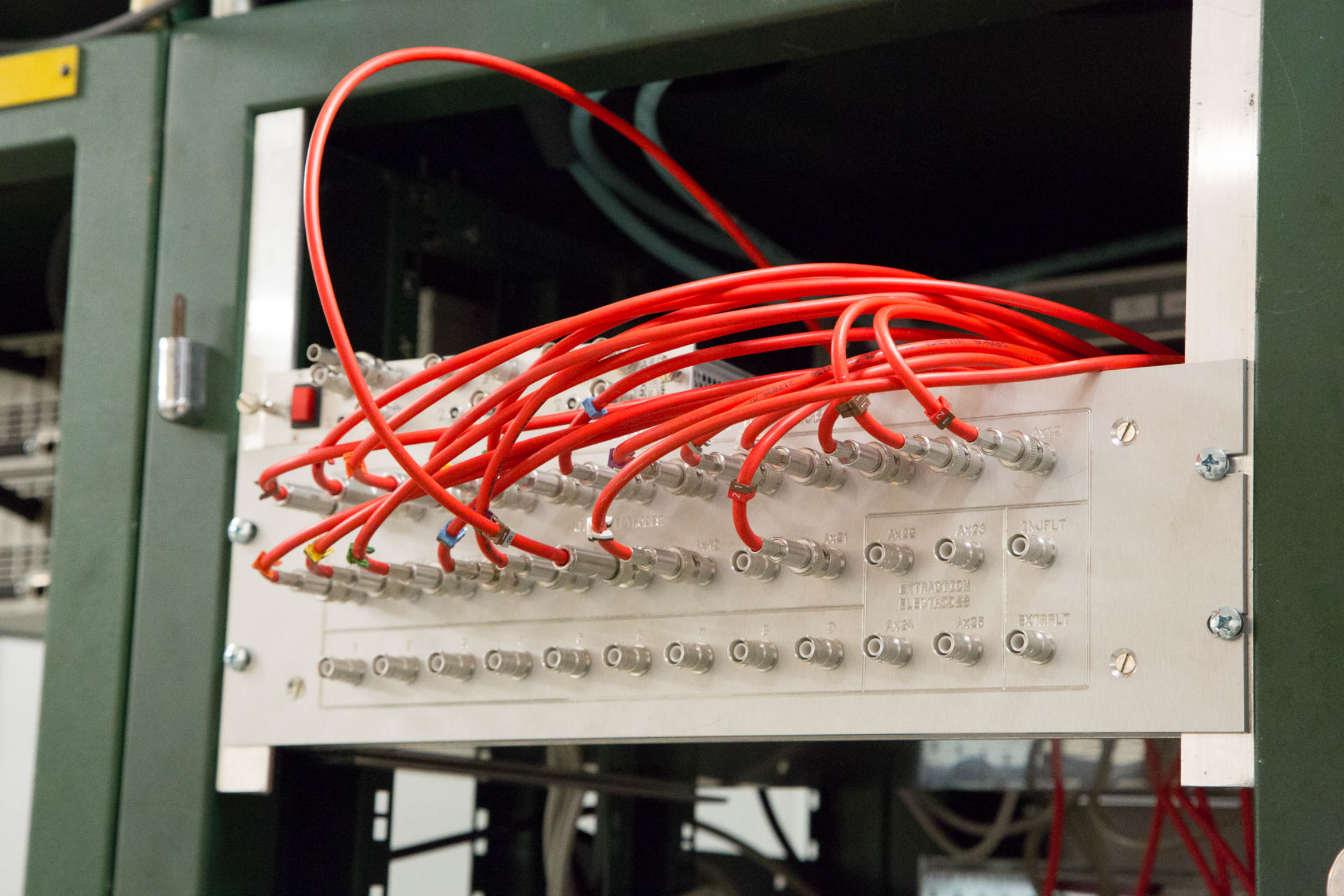

QP 21


CLOSED
OPEN
VAT

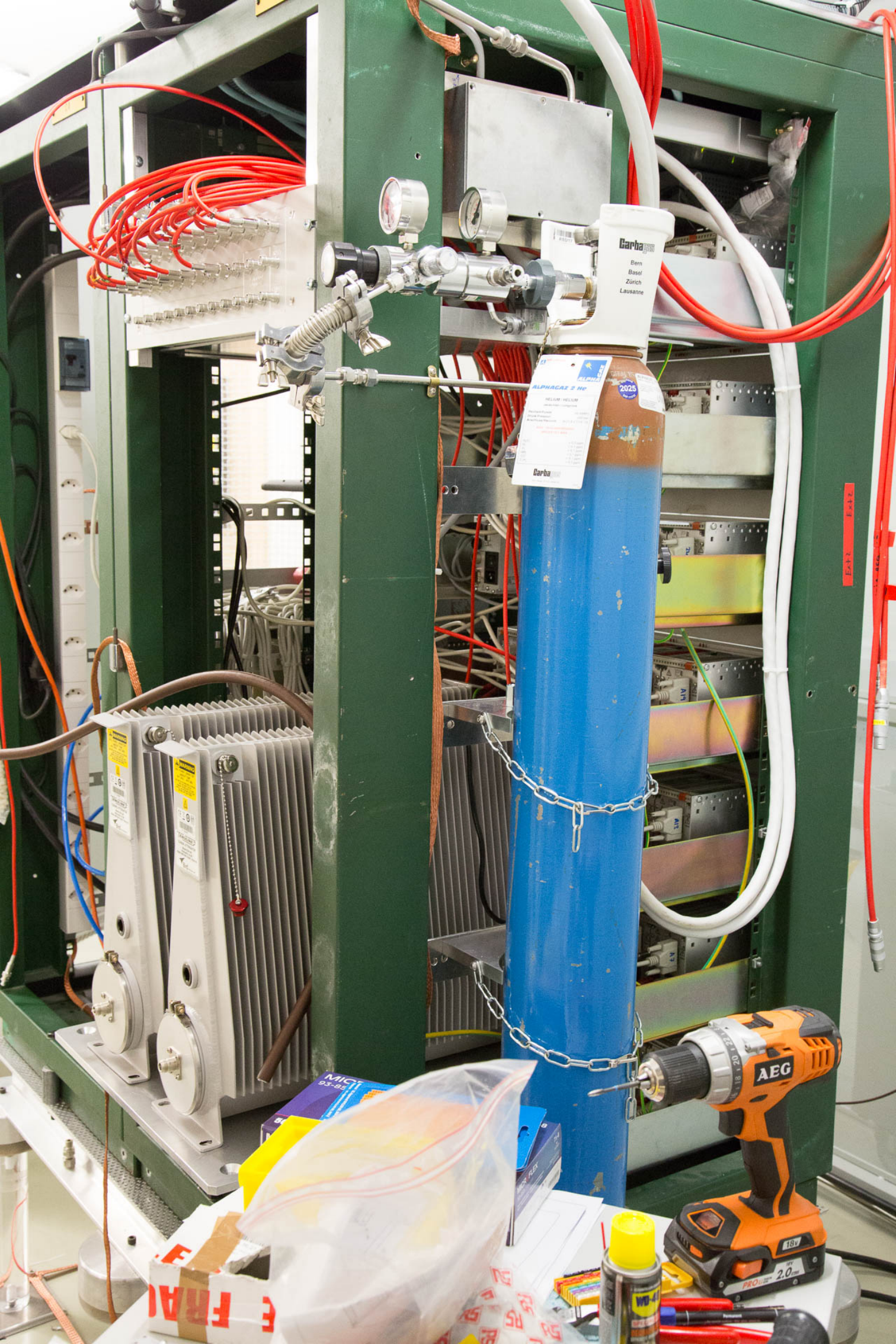

MAG.DRIVE IM
RFQ_VPT2


UPLINK
P26-S-IPZ-SHI
INJ1
EXT2
INJ2
EXT1
DC POWER SUPPLY
CV CC
MODE
DC POWER SUPPLY
CV CC
MODE
VOLTAGE

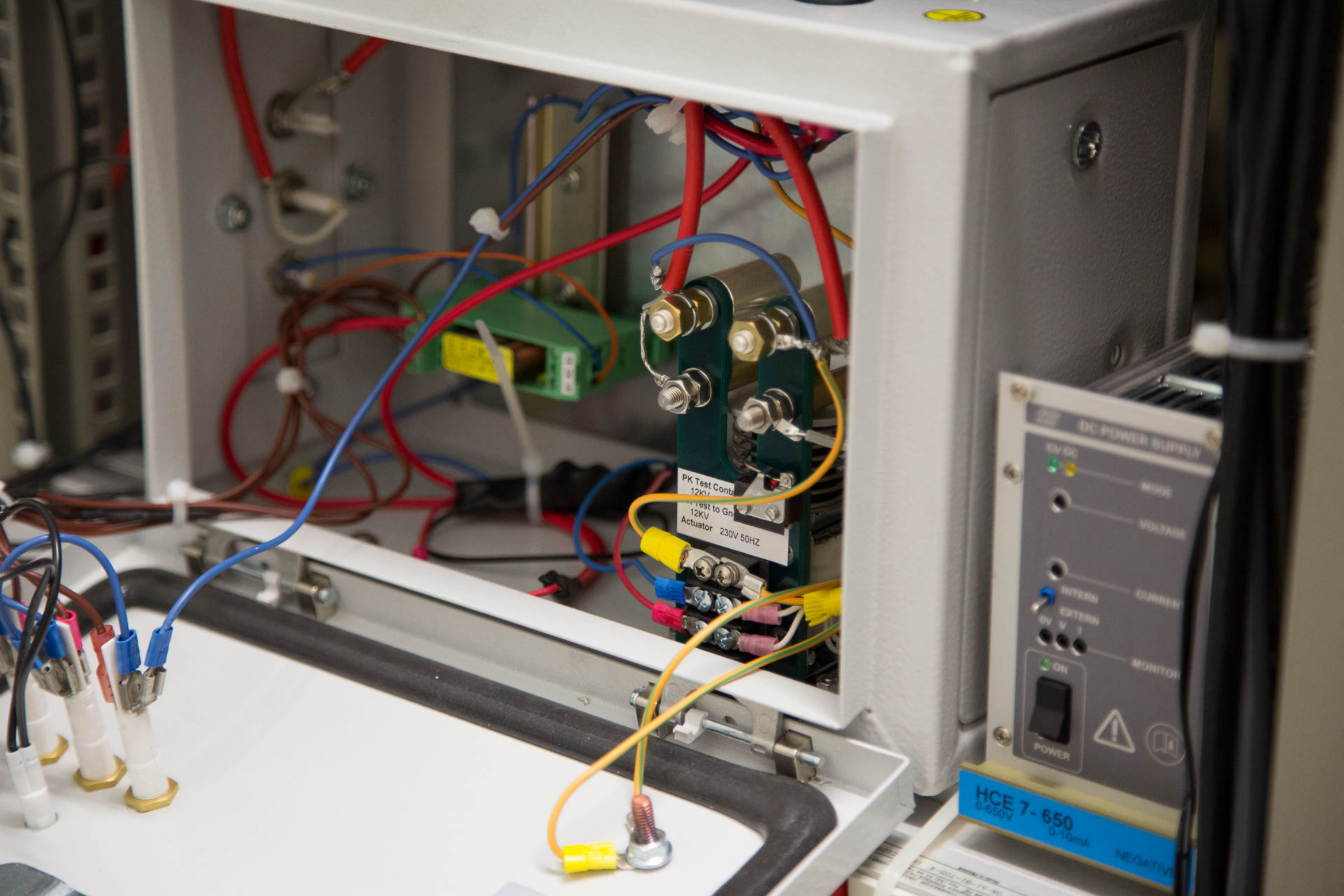

control
RS232


AX12
AX21
AX22
AX23
INJFLT
EXTRACTION
ELECTRODES
AX24
AX25
EXTRFLT


DANGER
HIGH / HAUTE
TENSION
DANGER
HIGH / HAUTE
TENSION

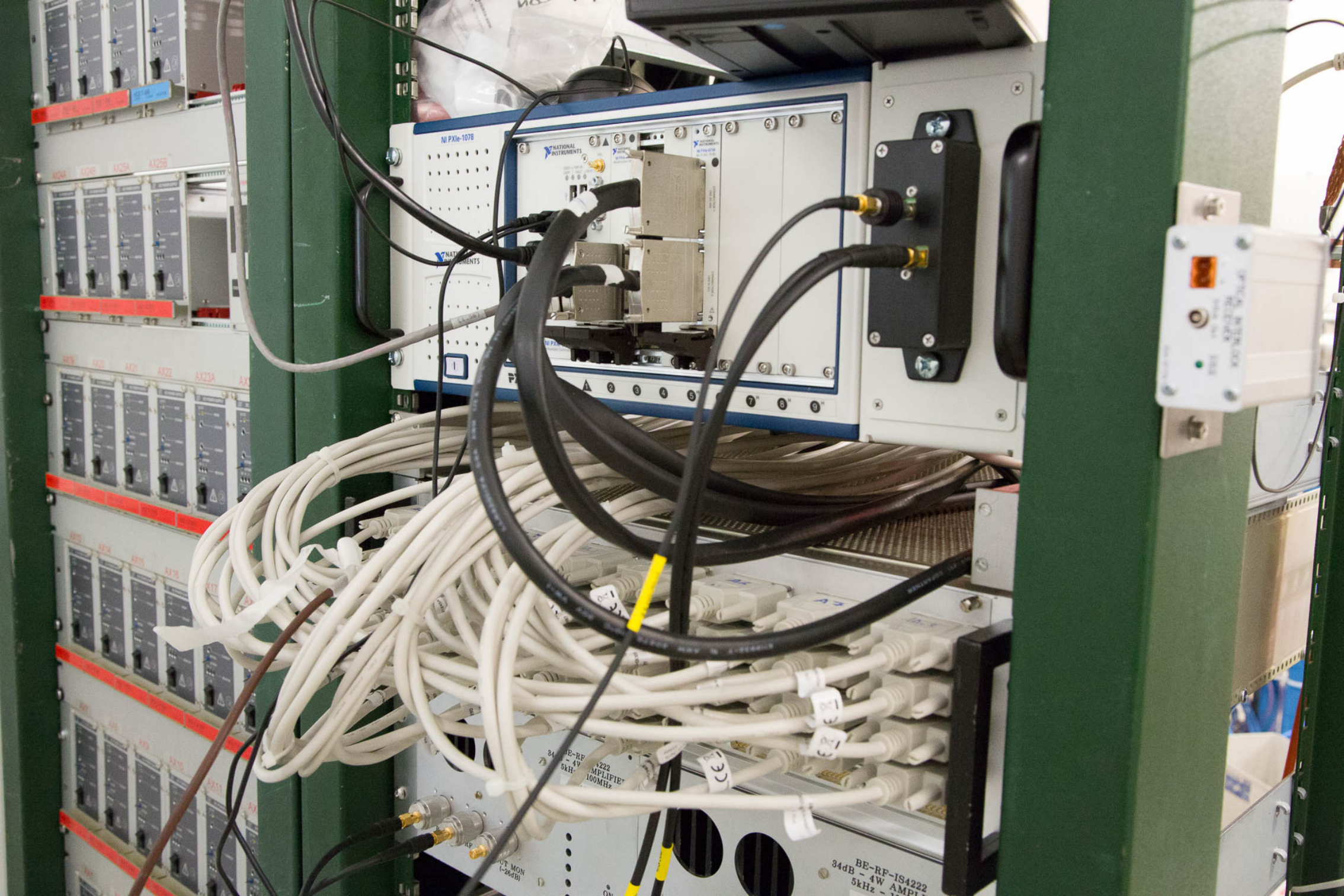

Carbagas
Bern
Basel
Zürich
Lausanne
ALPHAGAZ 2 He
2025
AEG
18V
2.0


NATIONAL INSTRUMENTS
cRIO-906
Agilent
IDP-7
Dry Scroll Pump
ON OFF
H.V PSU
Switch
System
Power
EDD4 E5P5C

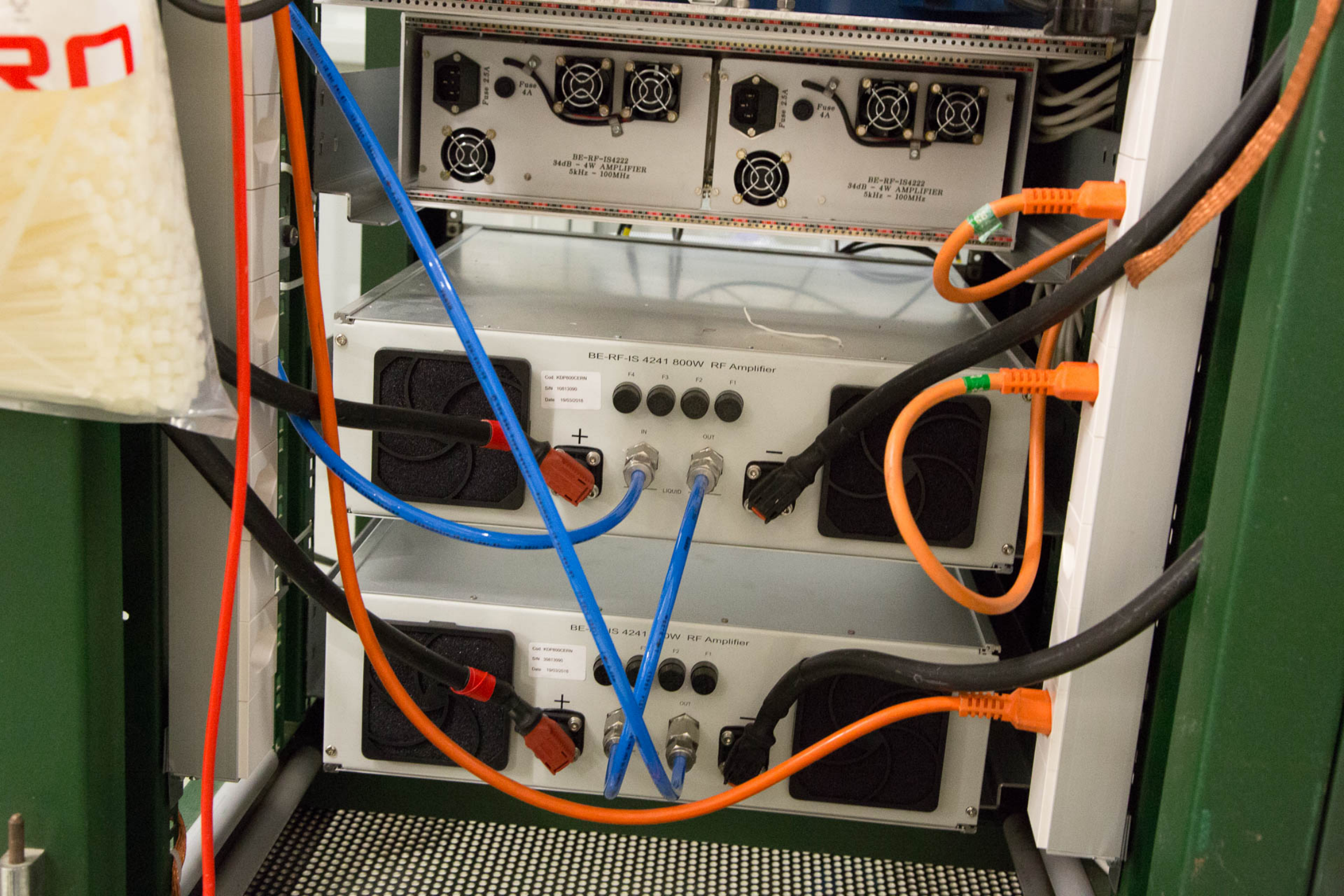

PK Test Conta
12kV
Test to Gn
12KV
Actuator 230V 50HZ
HCE 7- 650
0-650V
0-10mA
NEGATIVE
POWER

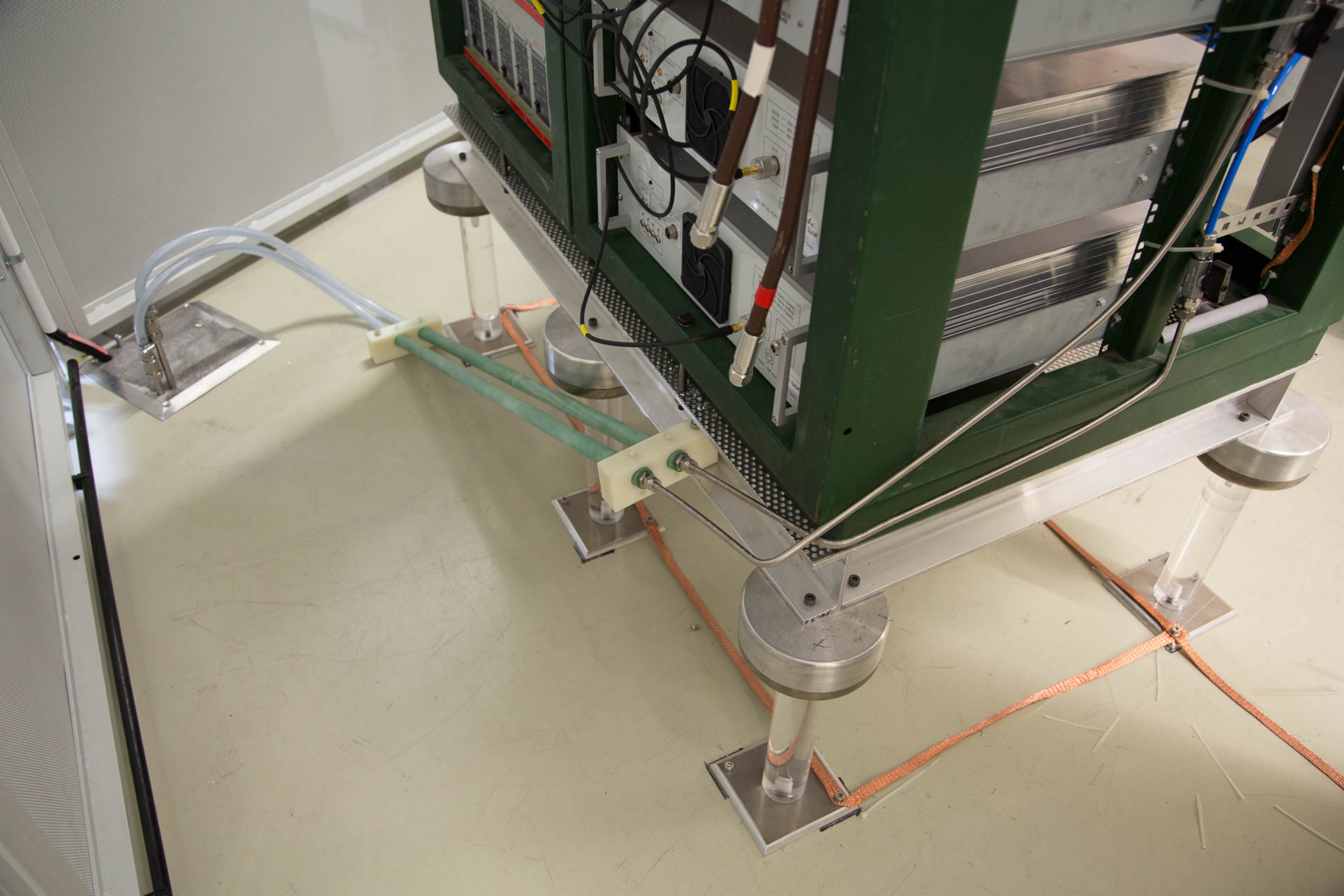

Schneider Electric
C16


FRONT END
Honeywell
MT-1911/E
20kA/1s
01/19


NI PXIe-1078
NATIONAL INSTRUMENTS
BE-RF-IS4222
34dB - 4W AMPLIFIER
5kHz - 100MHz

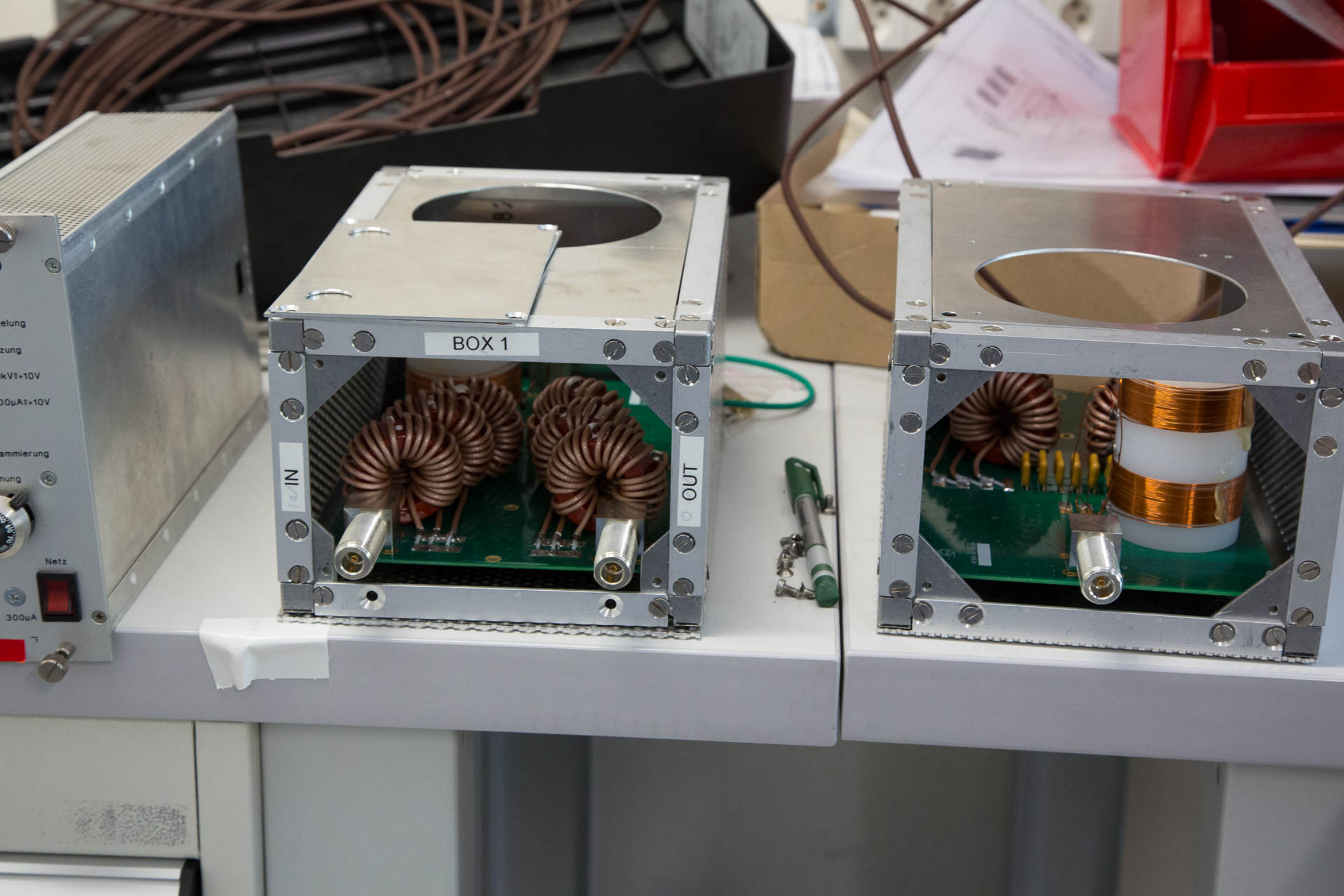

BE-RF-IS4222
34dB - 4W AMPLIFIER
5kHz - 100MHz
2018-083
OUT MON
(-26dB)
ON
800W — BW 20kHz-30MHz
200W — BW 10kHz-50MHz
50W — BW 5kHz-100MHz
RF IN
RF OUT
BE-RF-IS 4241 - RF Amp - 25

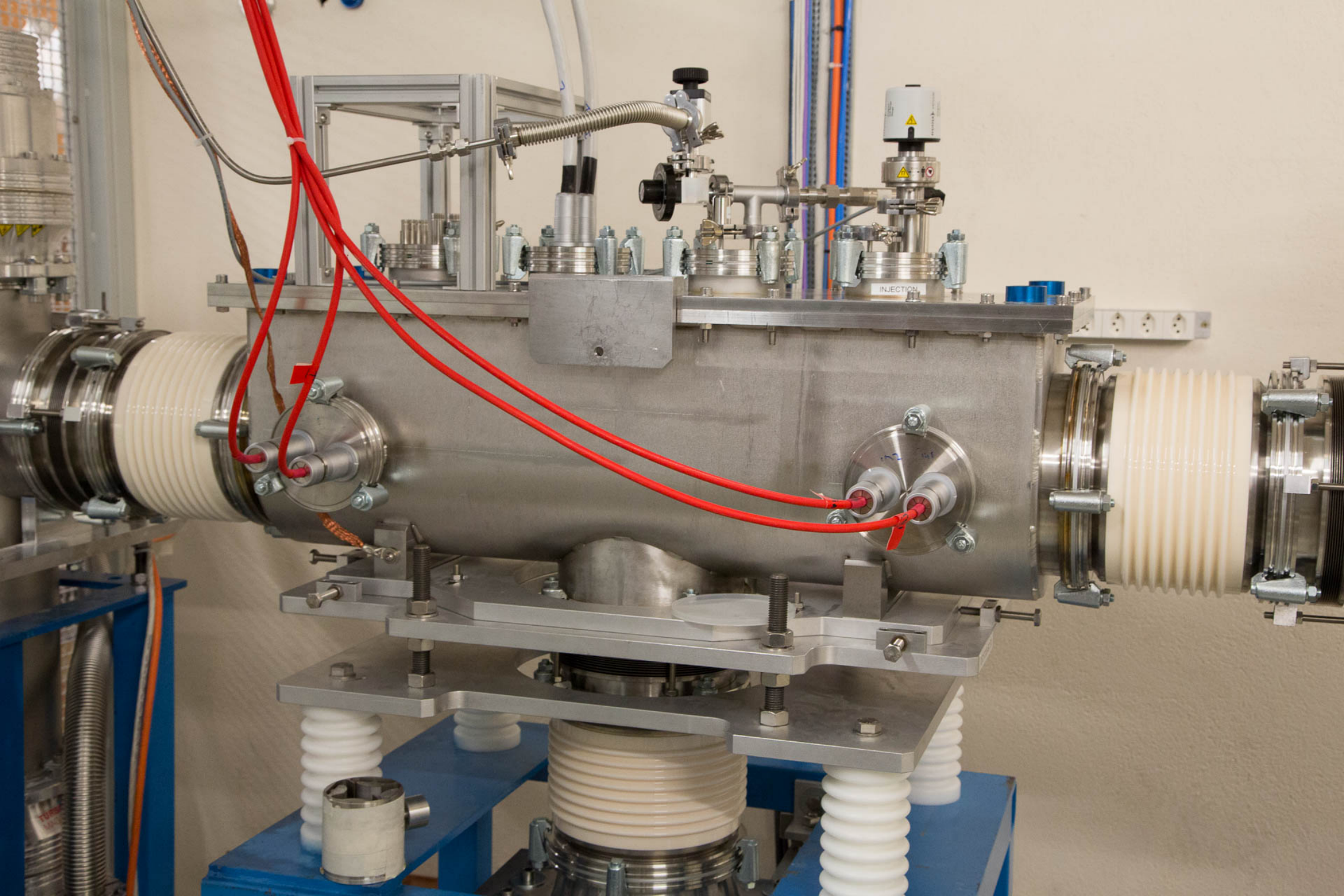

Fuse 2.5A
Fuse 4A
BE-RF-IS4222
34dB - 4W AMPLIFIER
5kHz - 100MHz
BE-RF-IS 4241 800W RF Amplifier
F4
F3
F2
F1
IN
OUT
LIQUID

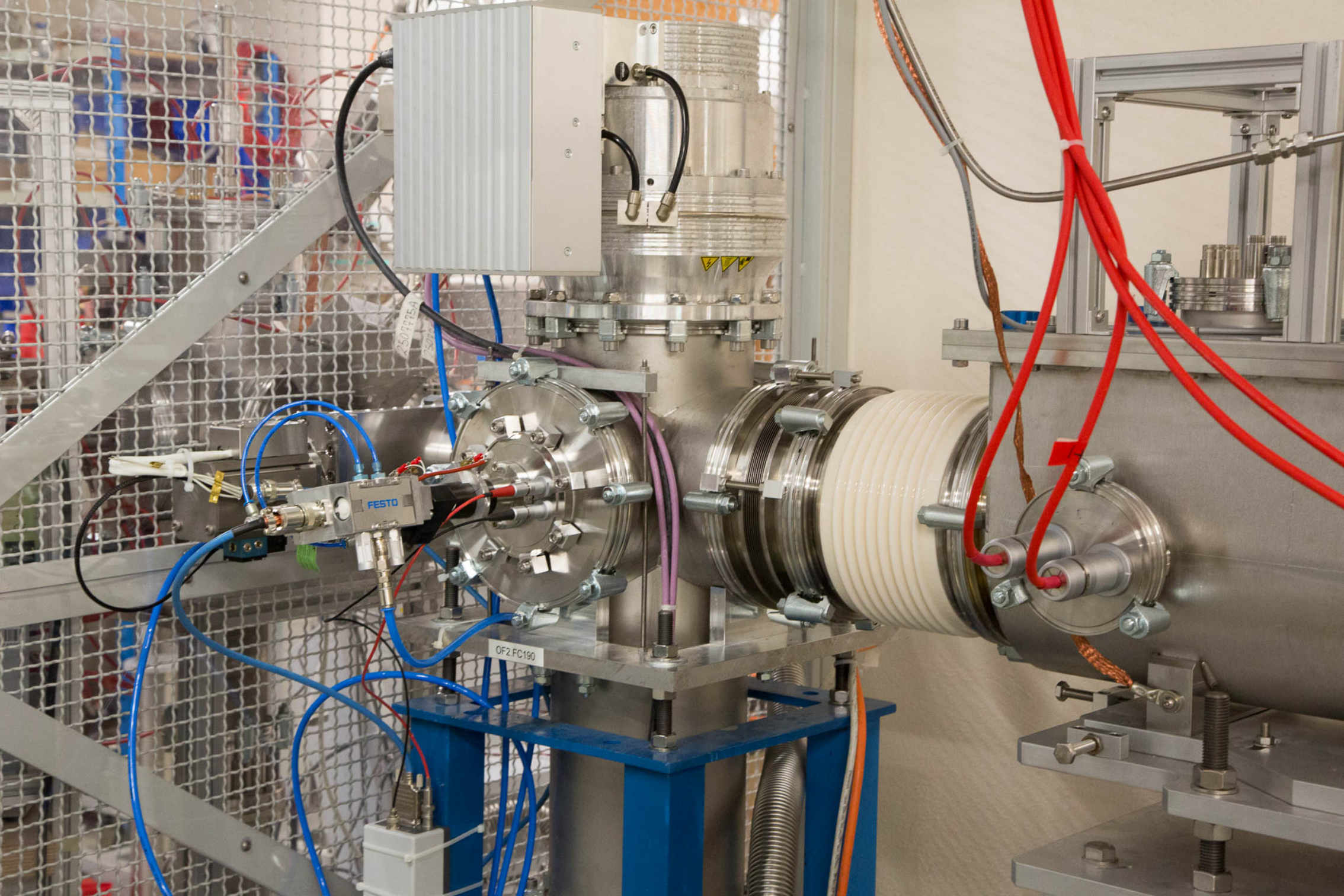


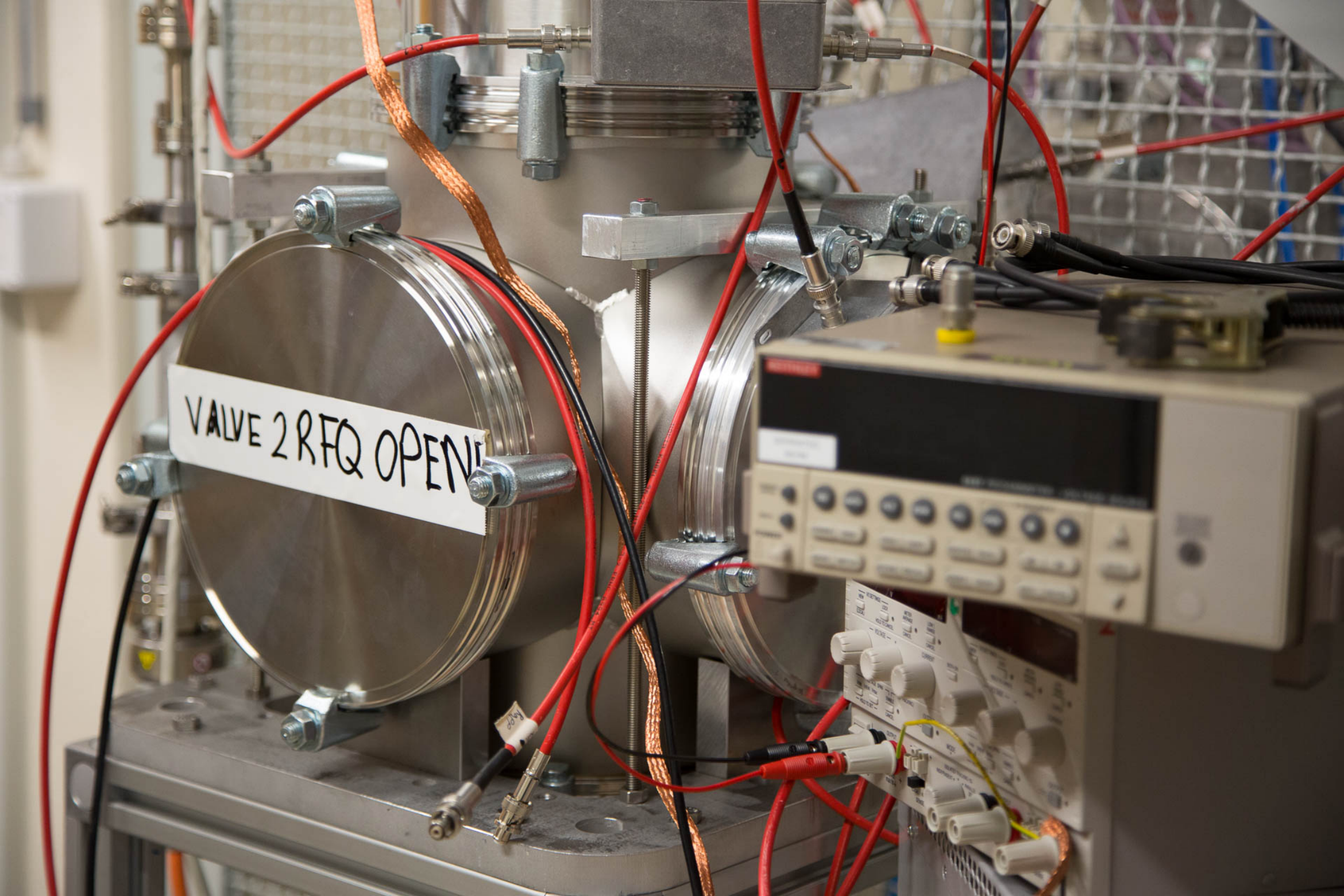

TDK·Lambda
VOLTAGE
DC VOLTS
GEN60-85
0 - 60V⎓ 0 - 85A
DC AMPS
CURRENT
ALARM
FINE
PREV/
OVP
UVL
FOLD
REM/LOC
OUT
TDK·Lambda
VOLTAGE
DC VOLTS
GEN60-85
0 - 60V⎓ 0 - 85A
DC AMPS
CURRENT
ALARM
FINE
PREV/
OVP
UVL
FOLD
REM/LOC
OUT


WARNING
MAX. POWER: 2000W CONT.
AMBIENT TEMP:
45°C MAX. -40°C MIN.
TENULINE
COAXIAL ATTENUATOR
Bird
WARNING
MAX. POWER: 2000W CONT.
AMBIENT TEMP:
45°C MAX. -40°C MIN.
TENULINE
COAXIAL ATTENUATOR
Bird
MICRO
93-853
50


BOX 1
IN
OUT
Netz
300µA


INJECTION


FESTO
QF2.FC190


VALVE 2 RFQ OPEN

Checklist RFQcb

OFFLine 2

- RF
  - Splitters
  - Cables — RFAmp2RFQ internal connections Replace
  - Controls — interlock, Labview
  - Cooling — Test.

- Plat Pot
  - interlock optic
  - Controls of cRio
  - Juliens approval
  - 3Ø distrobution
  - earthing 10mm Ø cable.

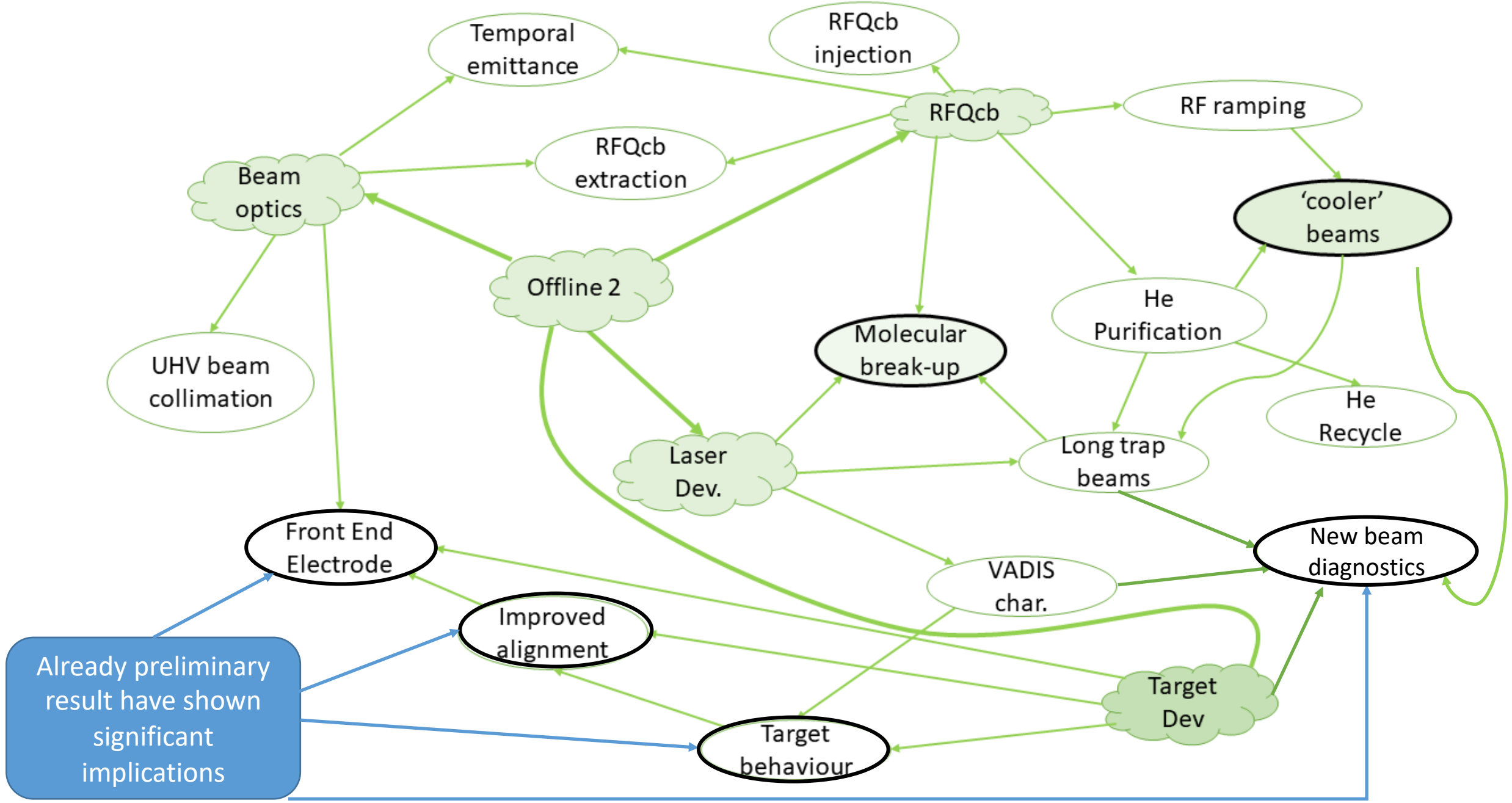
- Helium
  - Bronkhurst contols — Wire in check Relay
  - Redo plumbing
  - install pressure gague.

- PSU's
  - 20kV line Pins + internal wire.
  - check Pixe Crate
  - Earthing

Turbos
-> Replumb cooling loop.
->

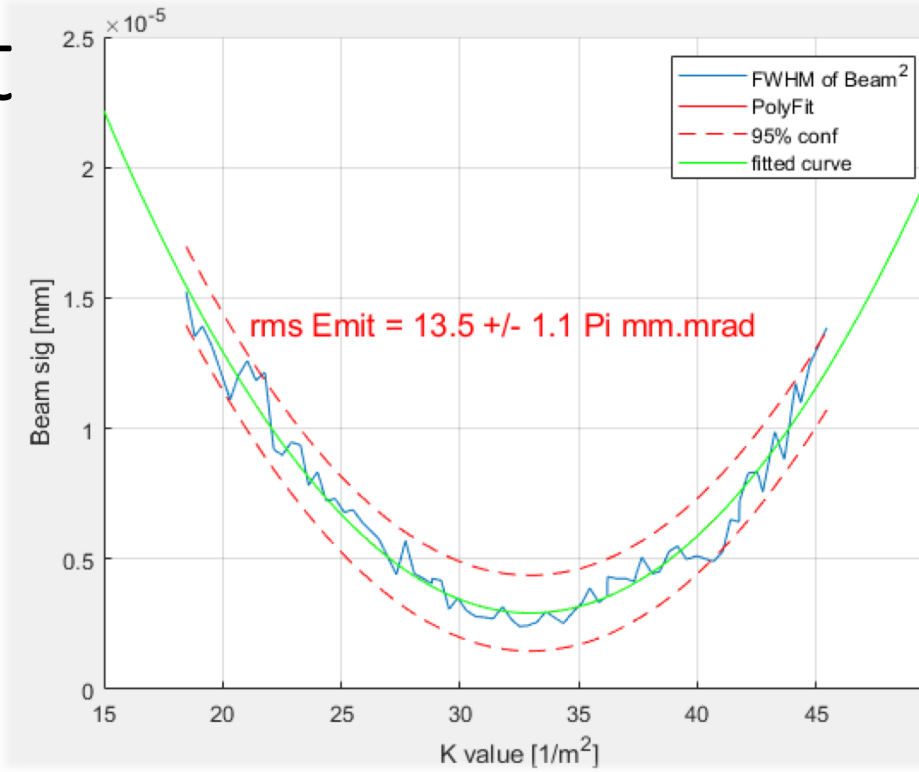
FE (before removal)
-> heating issue Pictures (Friday)

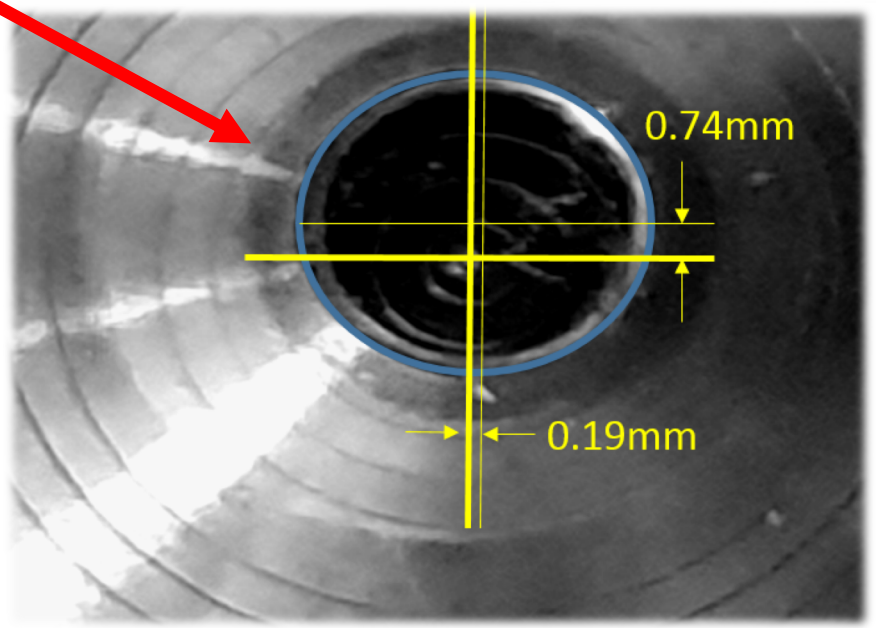
Proposed investigations of high impact to ISOLDE



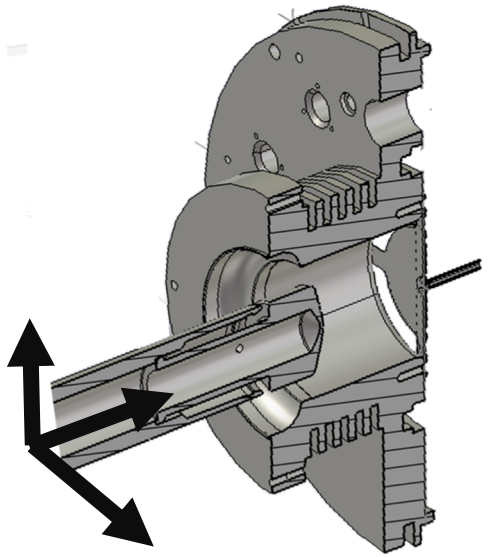
Front end electrode and alignment

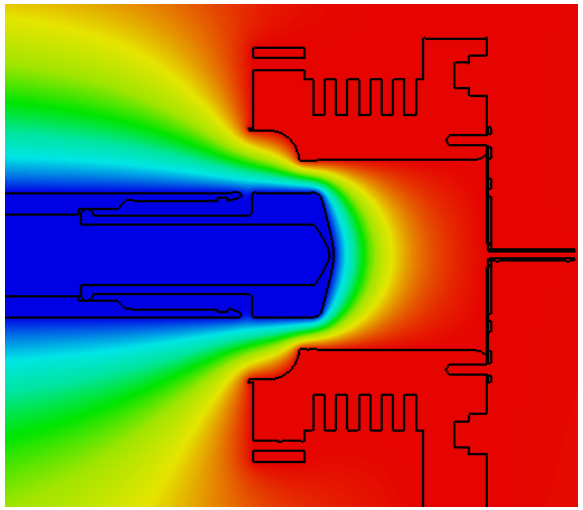
- Measurements with the OL2 FE have shown emittance values of 13.5+/-1.1 Pi mm mrad.
- Back tracked to the FE electrode misalignment after MEDISIS performed tests.
- With access to the front end it was easy to see the misalignment issue and investigate BEAM OPTICAL PROPERTIES
  - Beam losses
  - Emittance
  - Beam envelope location and size





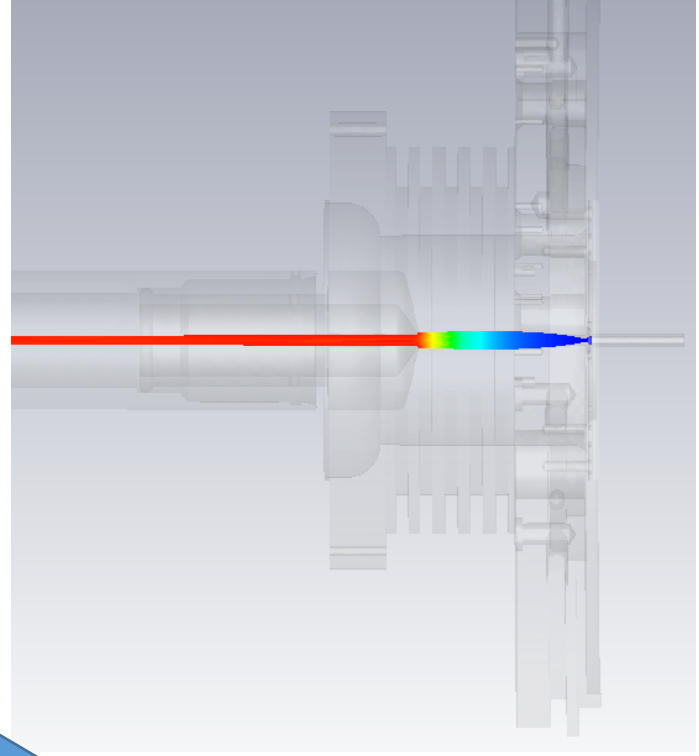
CST and integrated C++ code



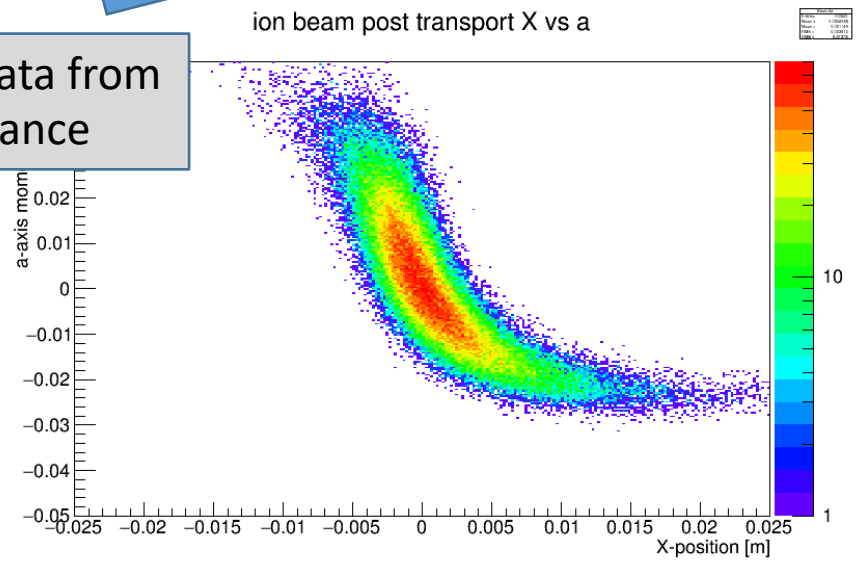


Generate a 3d electrostatic field map and export from CST

Transport beam through field map generated



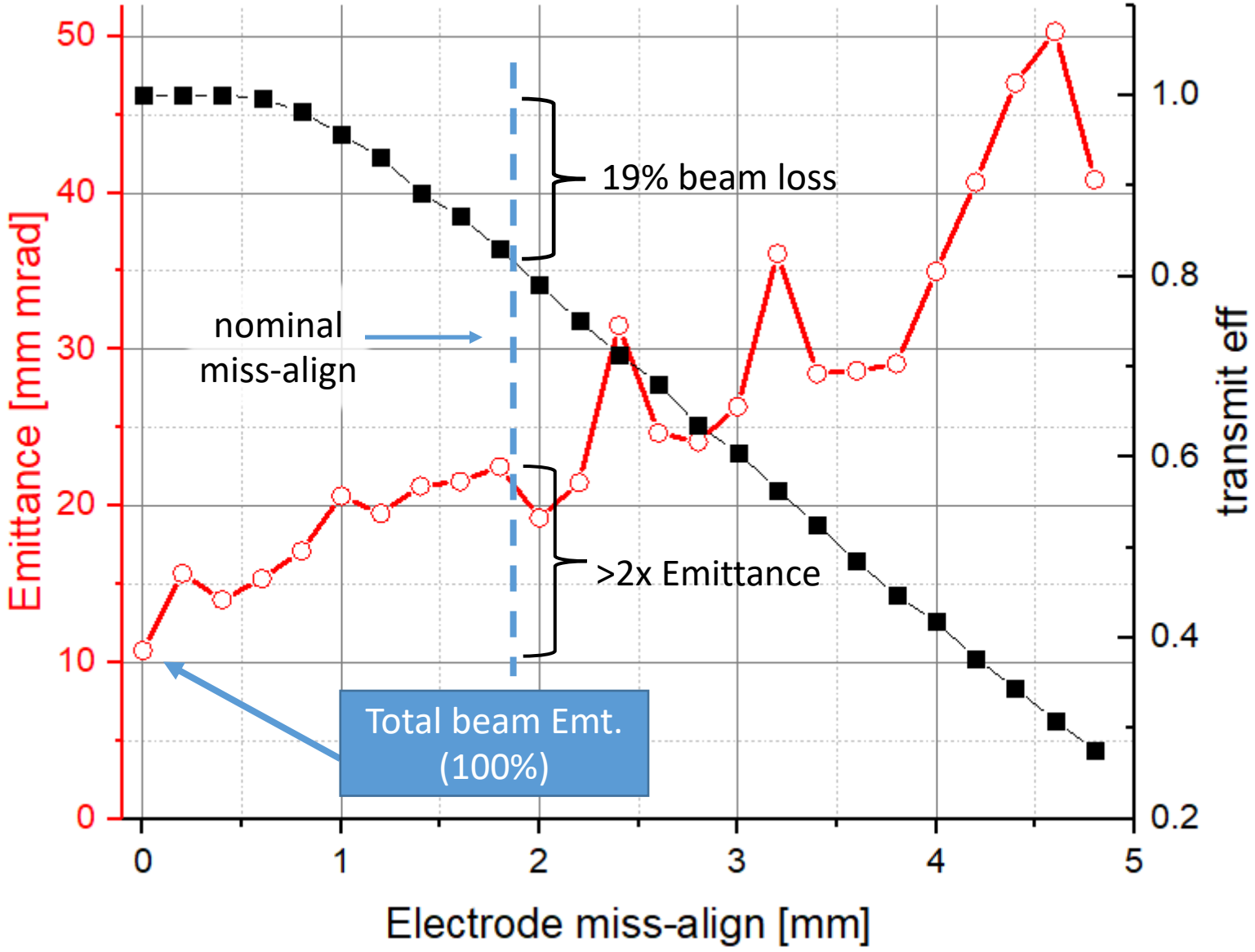
Extract data from emittance

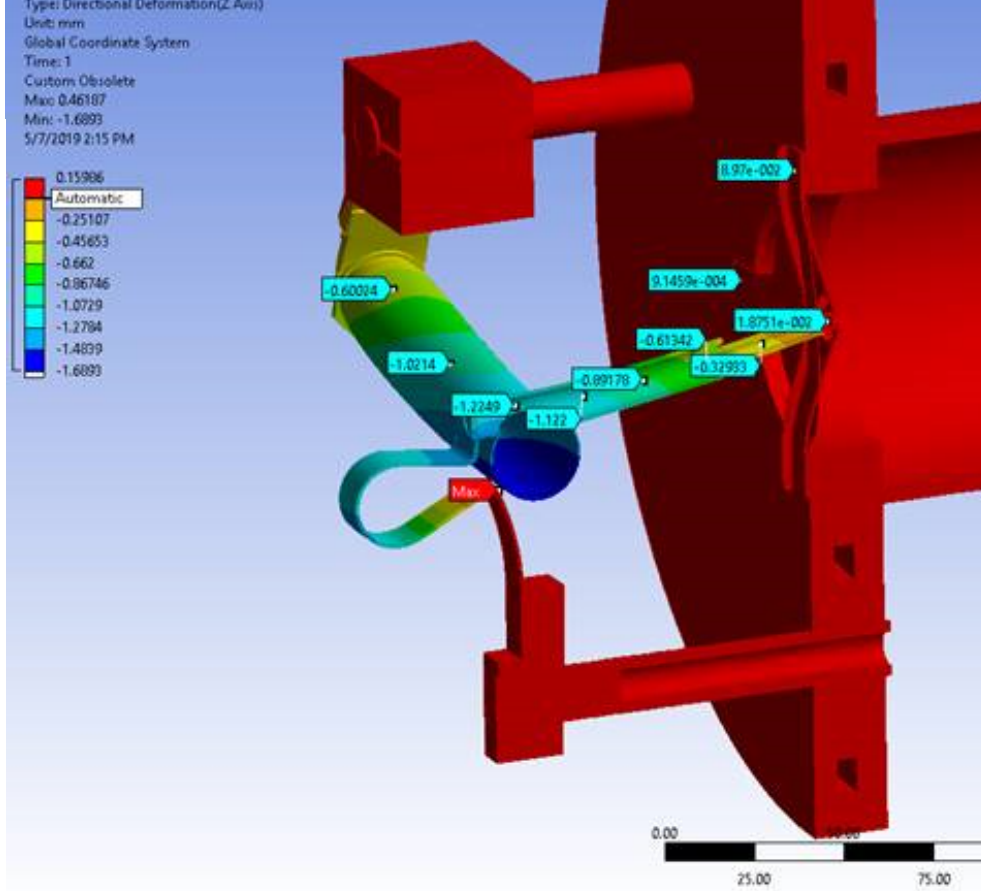


Perturb the electrode to a desired new position

Extract geometry from CATIA and simplify

Preliminary results



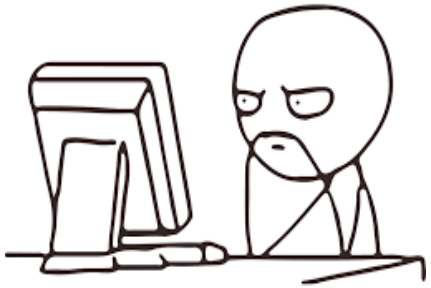


A full study needs to probe:

- Granularity of the mesh at ion source
- Thermal warping of line and altering the momentum of initial beam
- Gap distance between source and electrode.

Boxes of lose component's in 2016

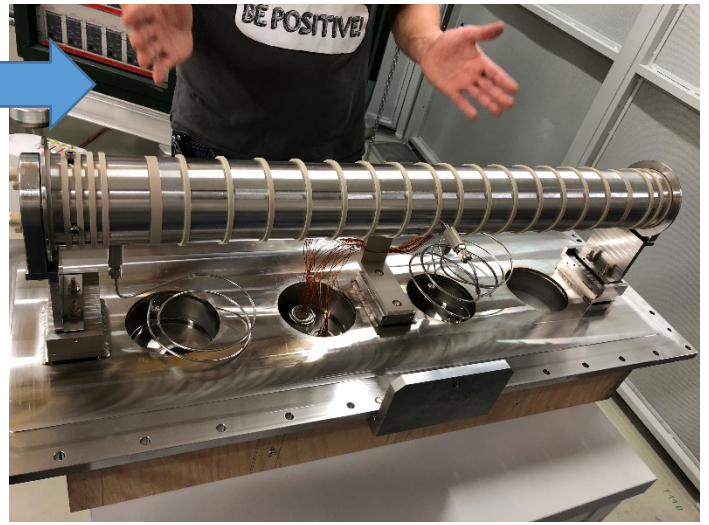
Serious thinking



ordering missing components

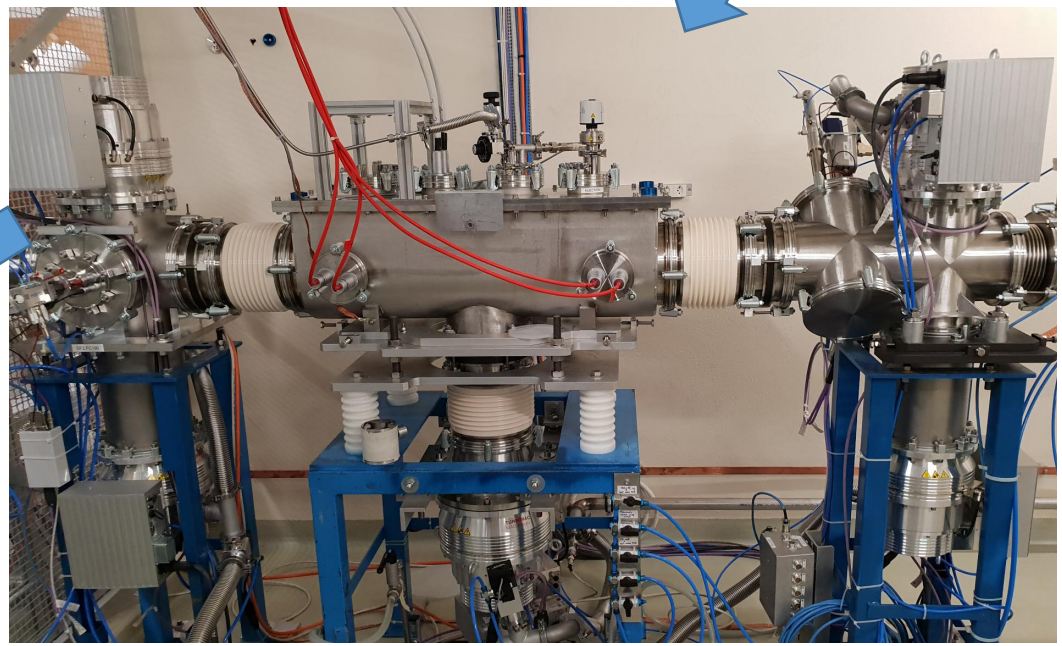
Rebuild with new parts

Redesign mounting systems and alignment systems. Design the gas injection systems and optimize for desired goals



Construction of core and mount with new

Installation of vacuum systems, supports, insulators, and beam line



Begin commissioning 2019

RFQ controls, vacuum & RF

- 40 independently controlled PSU
- RF generator with 2 stage amplification for 1kV pk2pk amplitude for 0.01-20 mhz
- Floating platform
- Offset control +/- 600 V ion source
- Helium buffer gas controls
- RFQ pressure monitoring systems

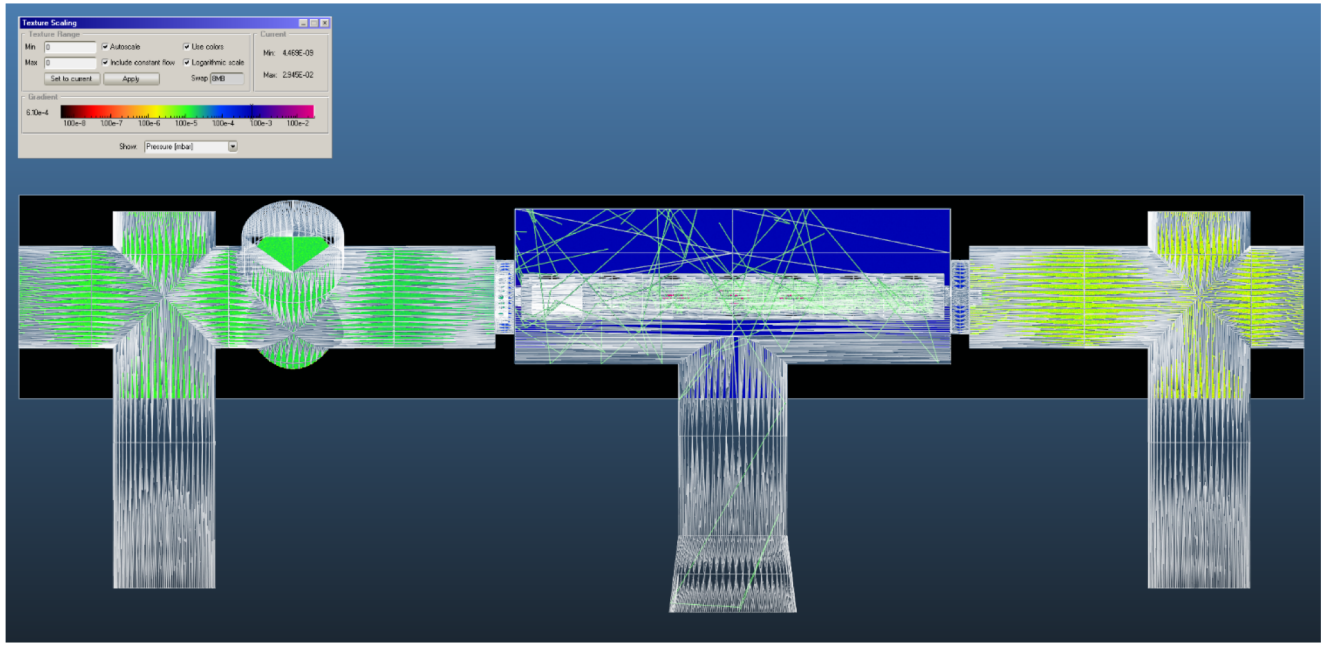
RFQ controls floating rack

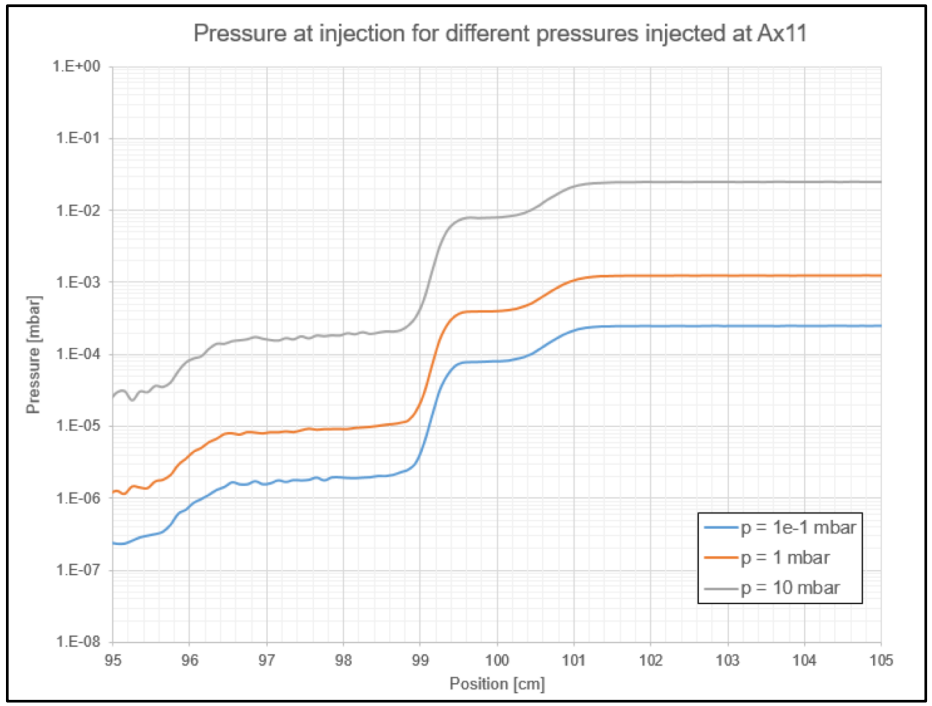
Platform offset potential control and interlocks

ISOLDE Off-line 2 isotope separator

Vacuum simulations of the gas injection into the RFQ for beam cooling studies using Molflow+

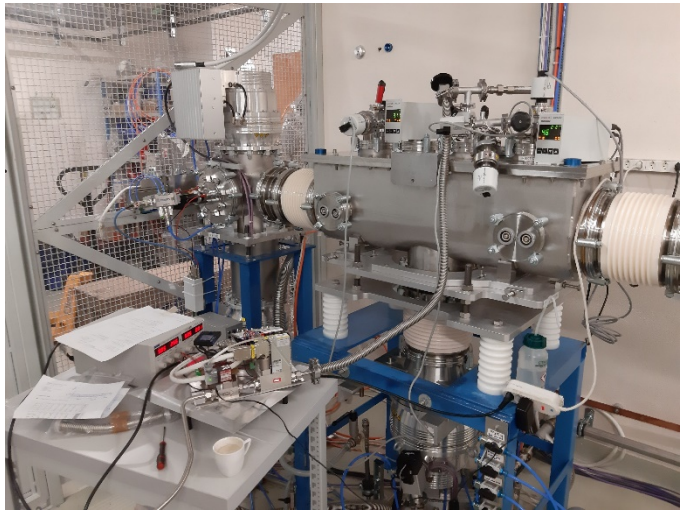
- Test particle Monte Carlo simulations
- Simulations for different pressures and different injection points
- Refinement of the geometry to take into account micro gaps between the pieces





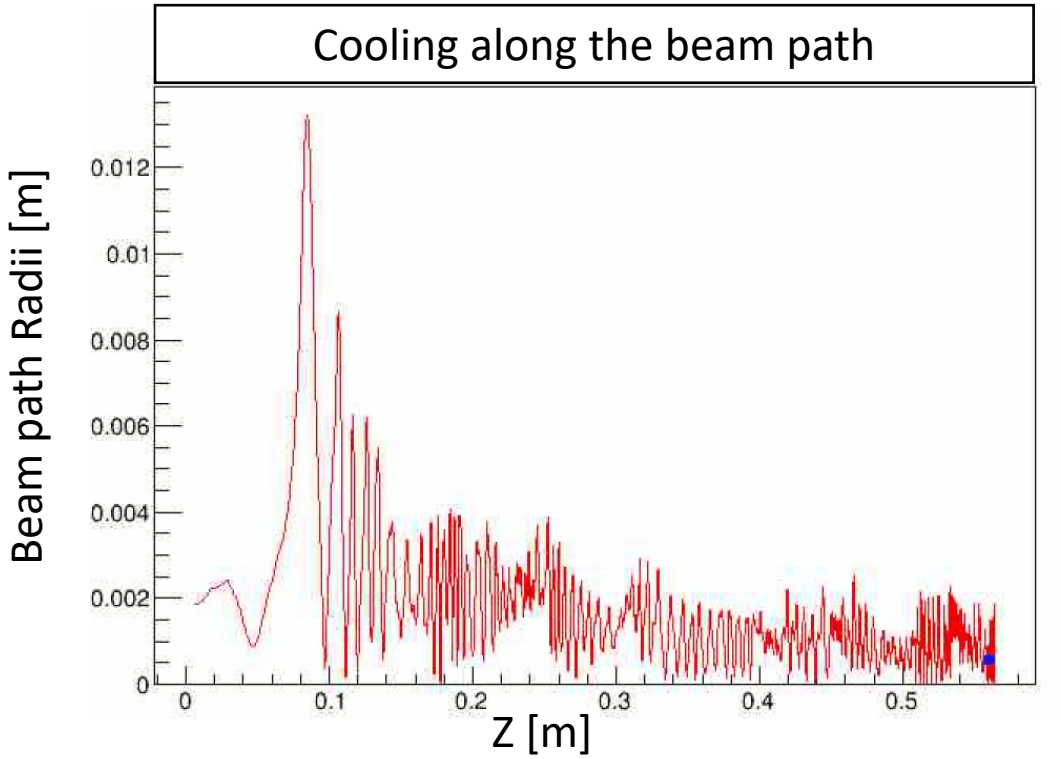
Construction of a test stand to benchmark the pressure in the RF stack and the vacuum chamber

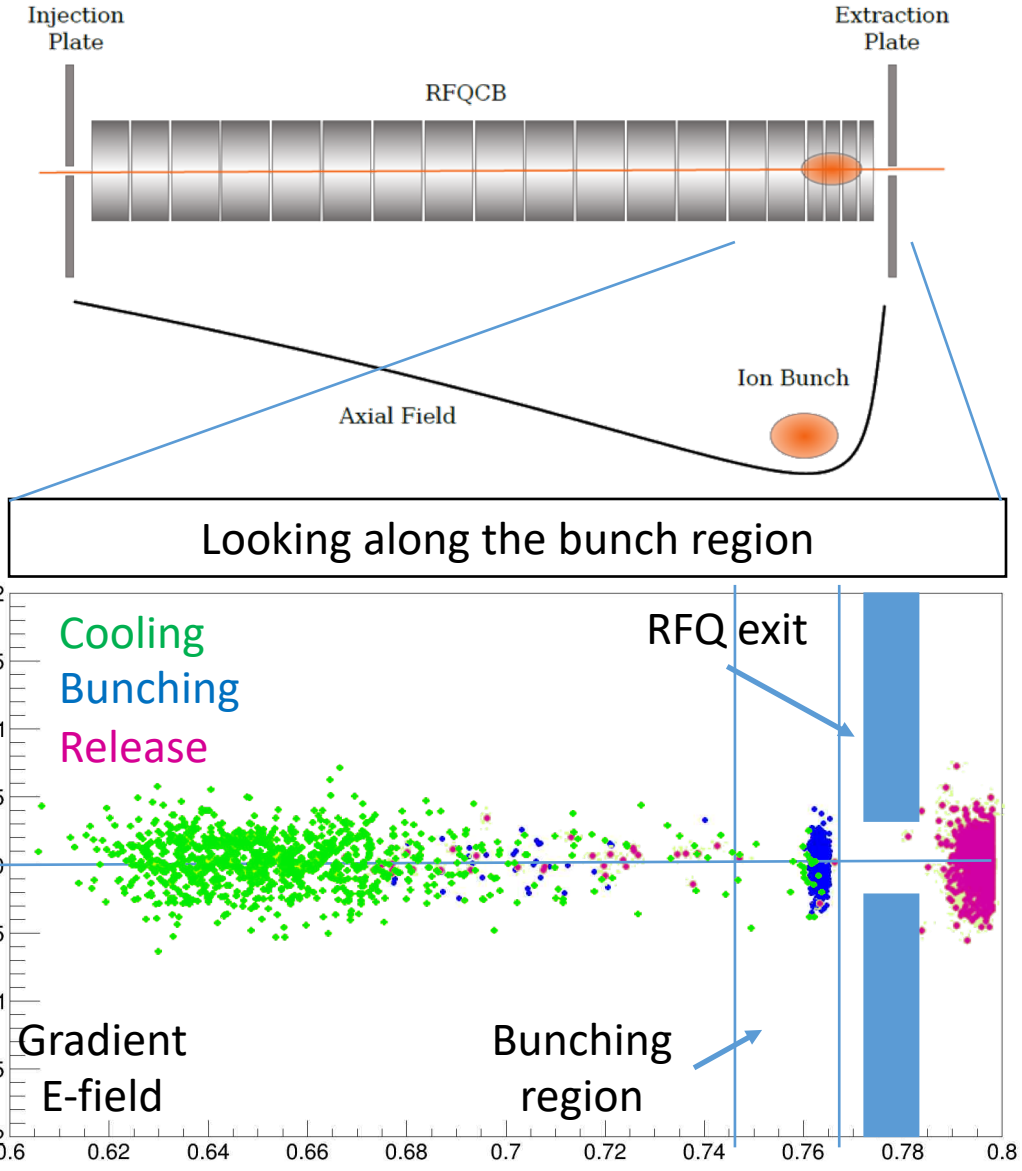
- Control of gas input through digital pressure controller
- Use of gauges in different locations to monitor the pressure



Simulated RFQcb behavior

- The ions oscillate due to the RF with chaotic scattering from helium
- Space charge and RF heating occur in the bunching region of minimal potential





TOF study simulated results

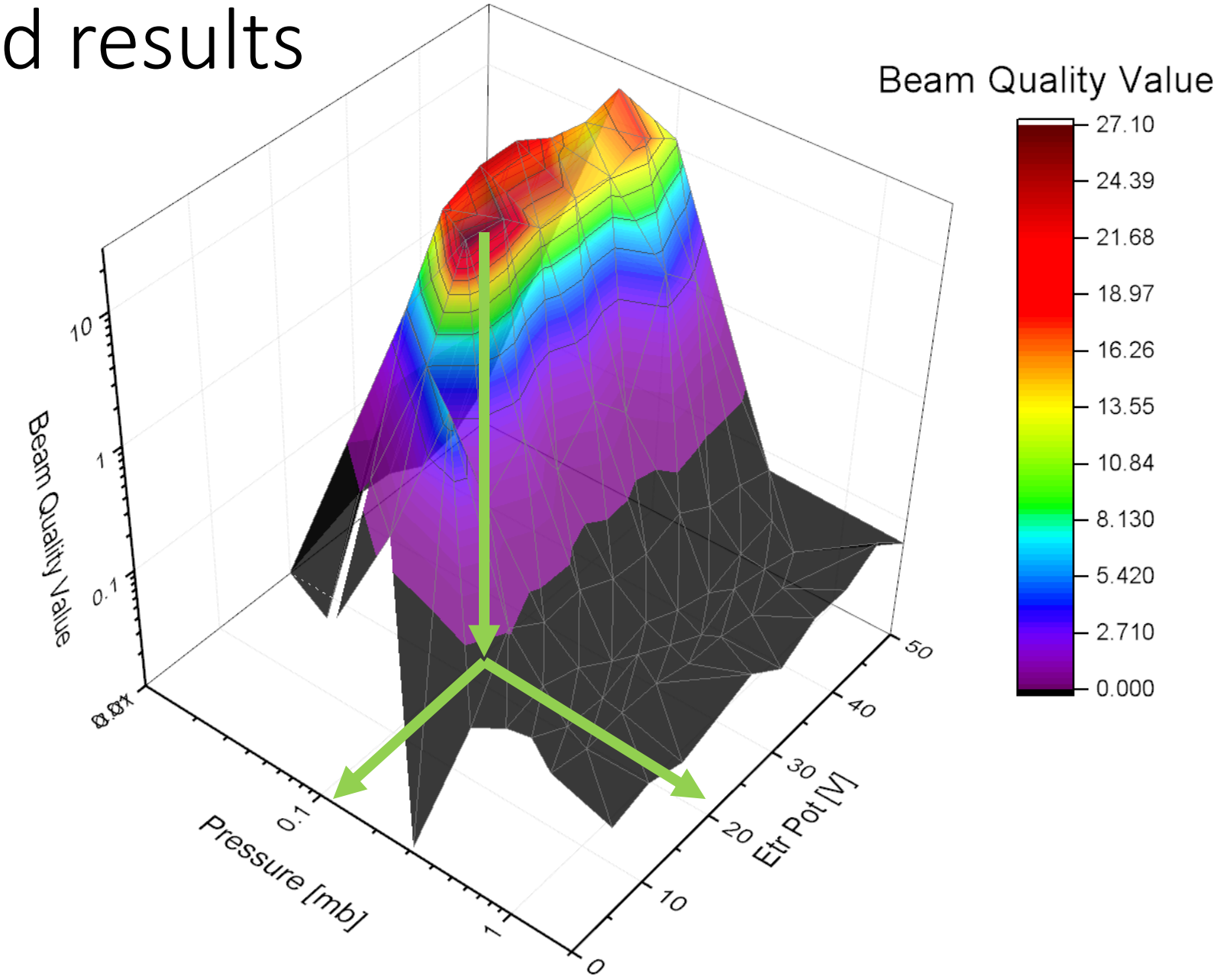
- Simulated K39 ions in trapped for 1ms of RFQcb then released.
- Beam Quality:

Transport efficiency

$$Q = \frac{\frac{N_{det}}{N_{inj}} A}{T_{FWHM}}$$

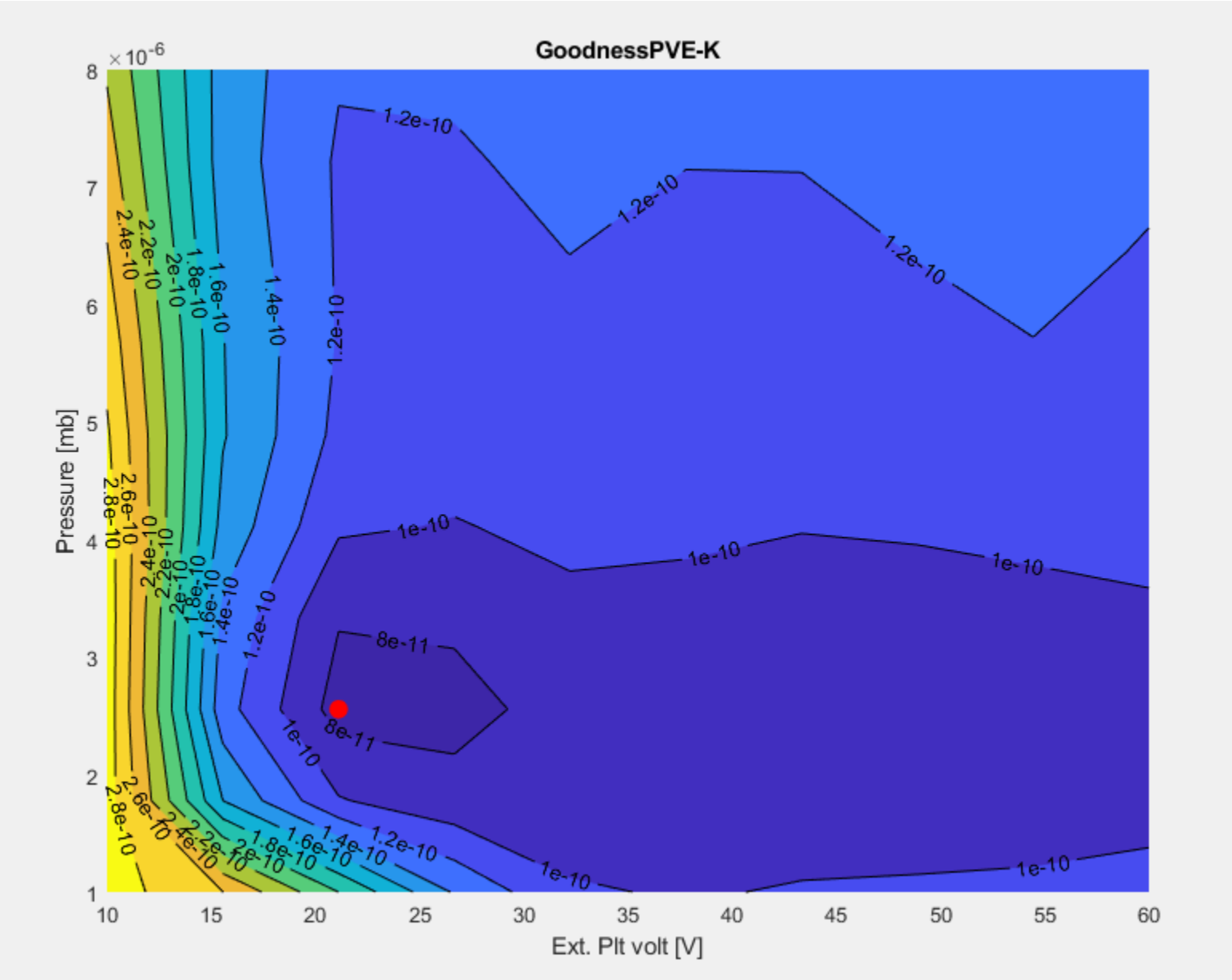
Weighting factor

FWHM of the beam bunch extracted



TOF study ISCOOL results

- Simulated point of best operation,
  - **p=0.1 mbar**
  - **Extraction pot 20 V**
- Experimentally determined values
  - Pressure ~0. 05 mbar*
  - **Extraction pot 22 V**
- The best conditions match closely to the simulated values.
- Offline 2 Will confirm this and space charge issues



*inferred from MOLFLOW+ simulations

Scenario

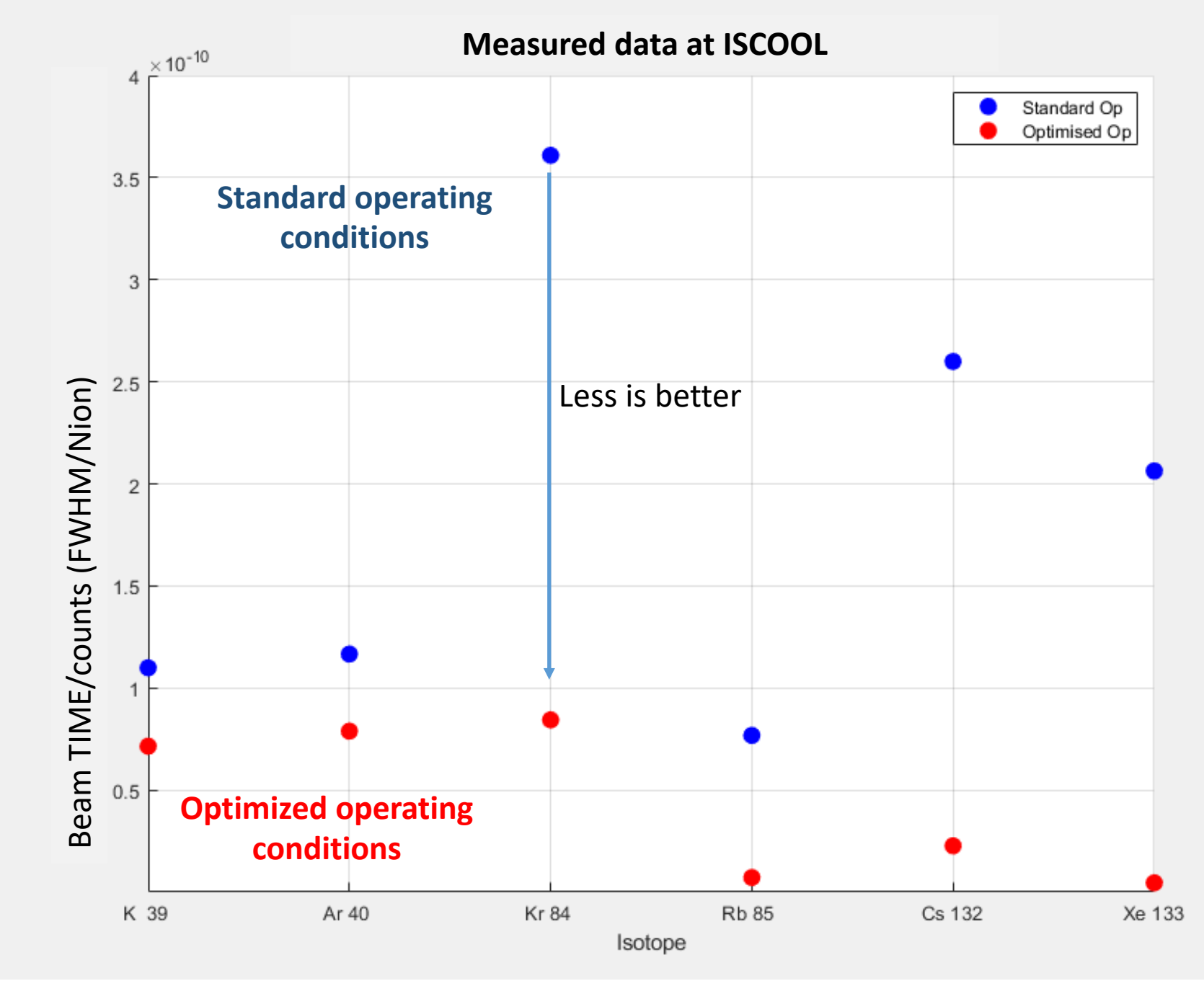
Users ask for a Sn108 beam of 10^3 bunched ions with low energy spread for an experiment in 2 months.

Offline 2 develops the tune required for this in advance using the RFQcb for similar stable beam

Upload tune settings to ISCOOL from Offline 2

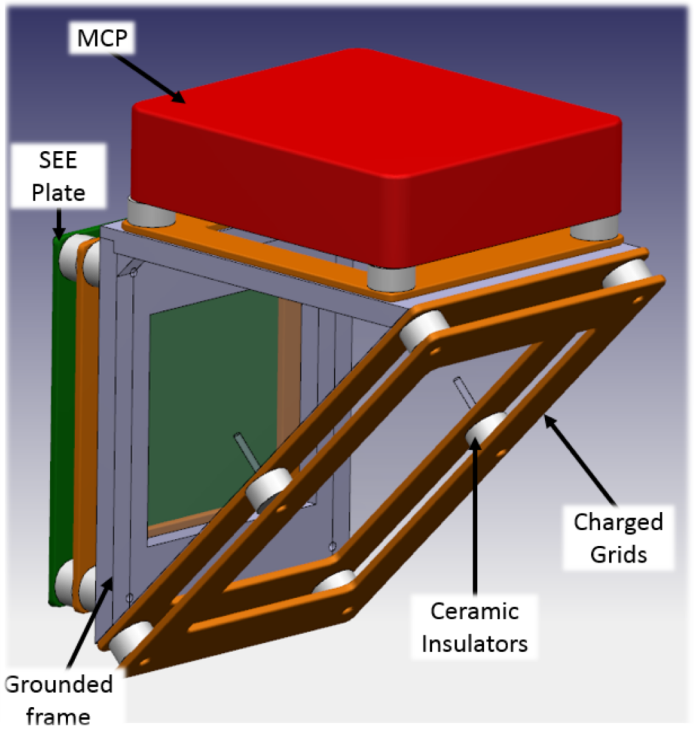
ISOLDE setup becomes:

- **More efficient**
- Produce **more isotopes**
- Tune is **optimized** for the experiment

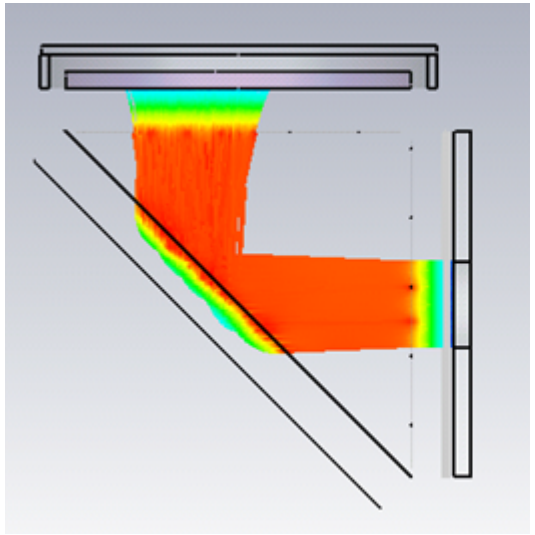


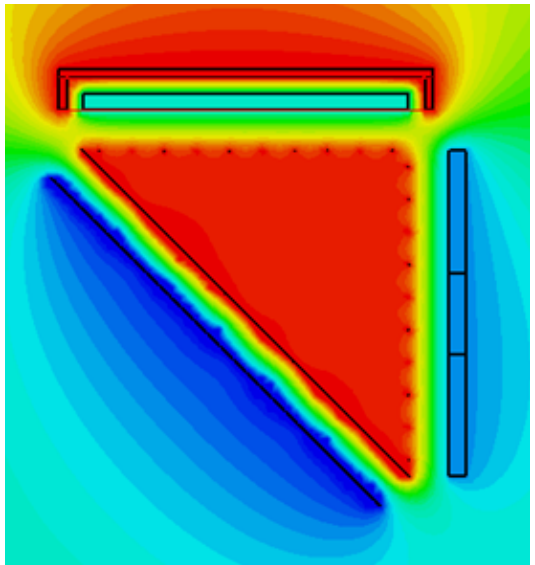
New Time of Flight Detector

Project proposed in 2017

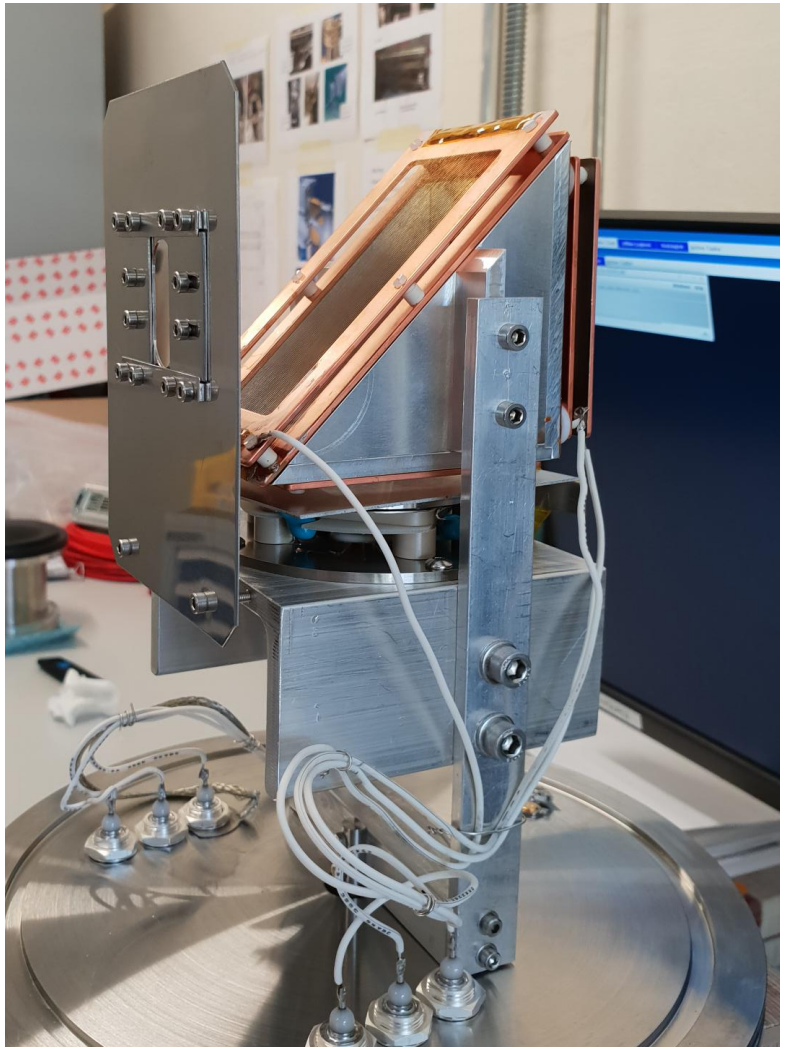


Simulations during 2017/18

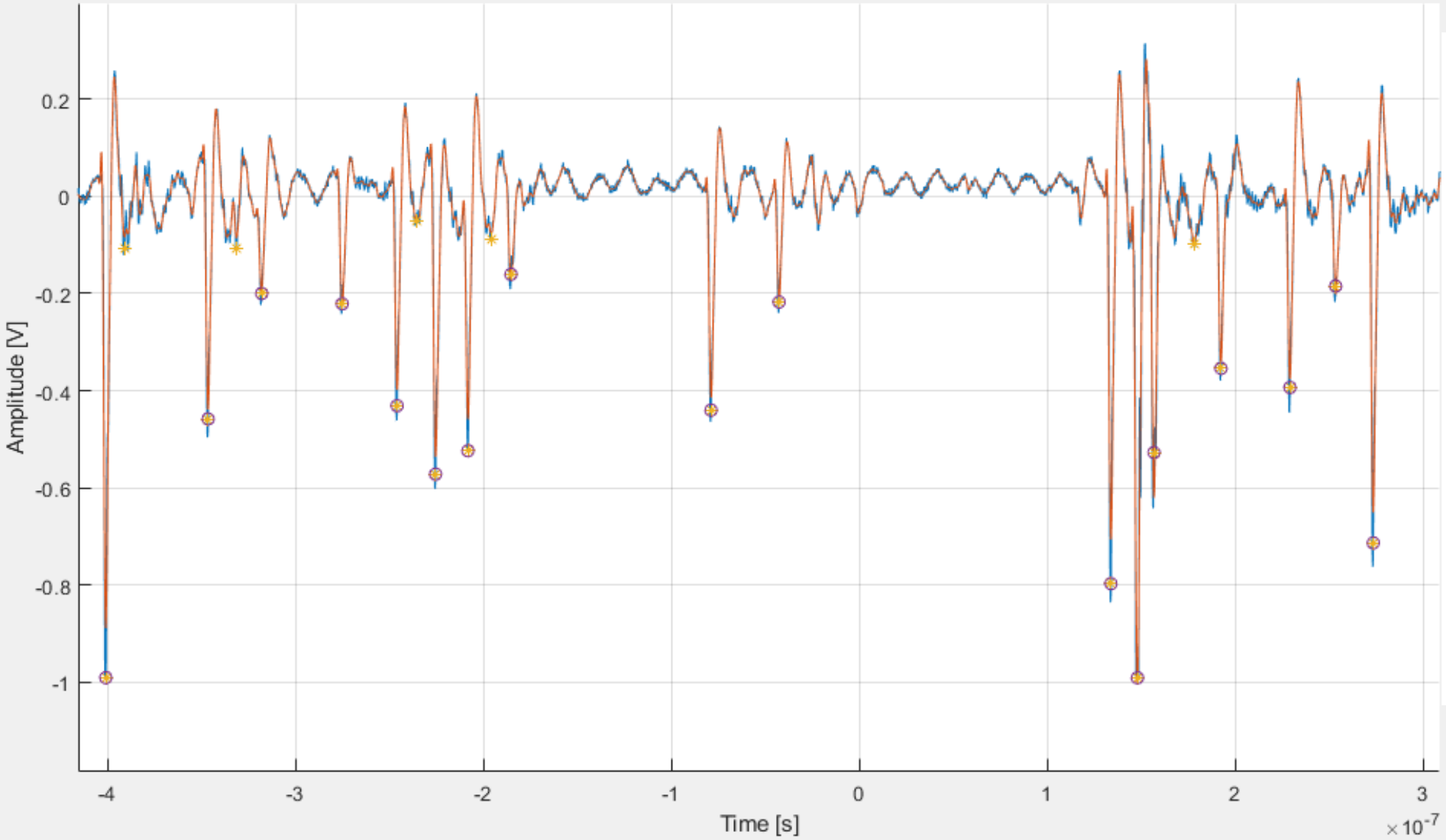




Construction Completed 2018



Results

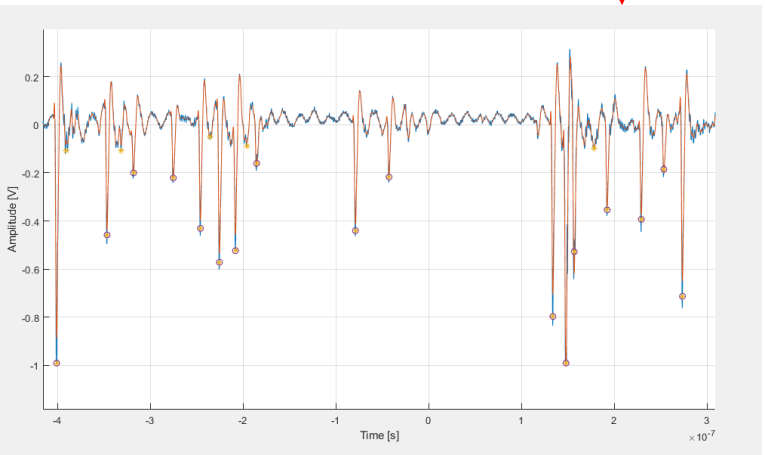


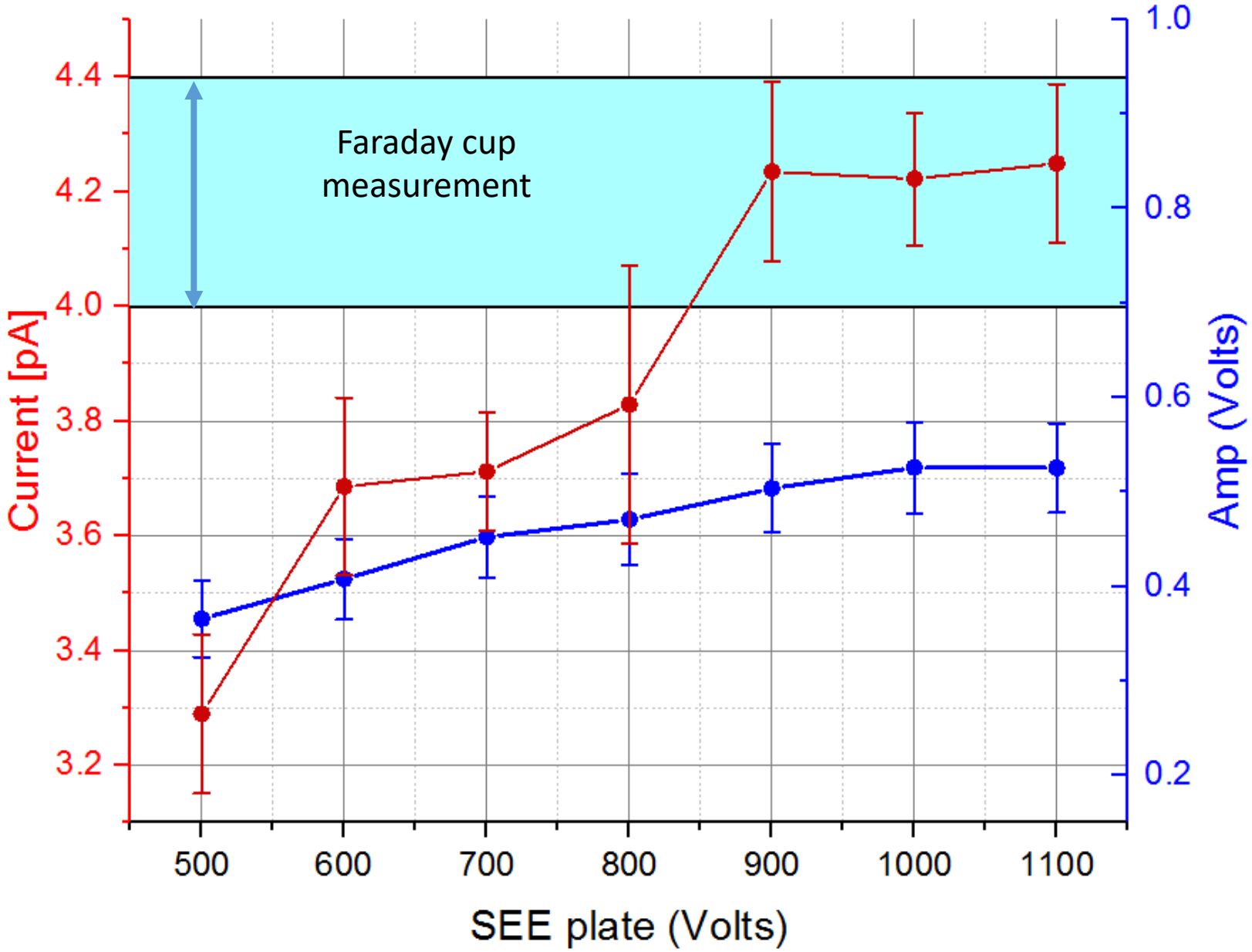
- Single ion detection
- Timing resolution per pulse = 0.7 ns
- Pile up rejection software

Results

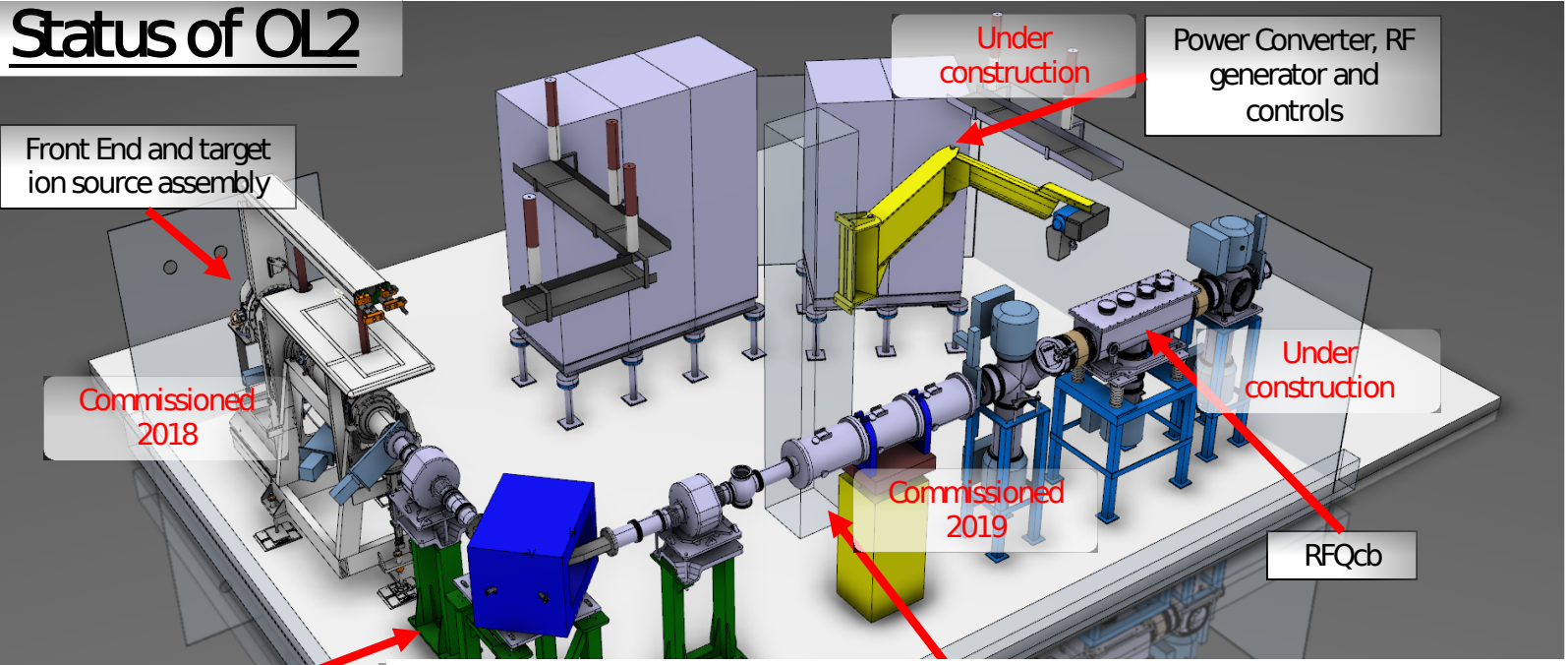
Ion beam current from sum of detector signals

$$I(t) = \frac{q\sum C_i}{dt}$$

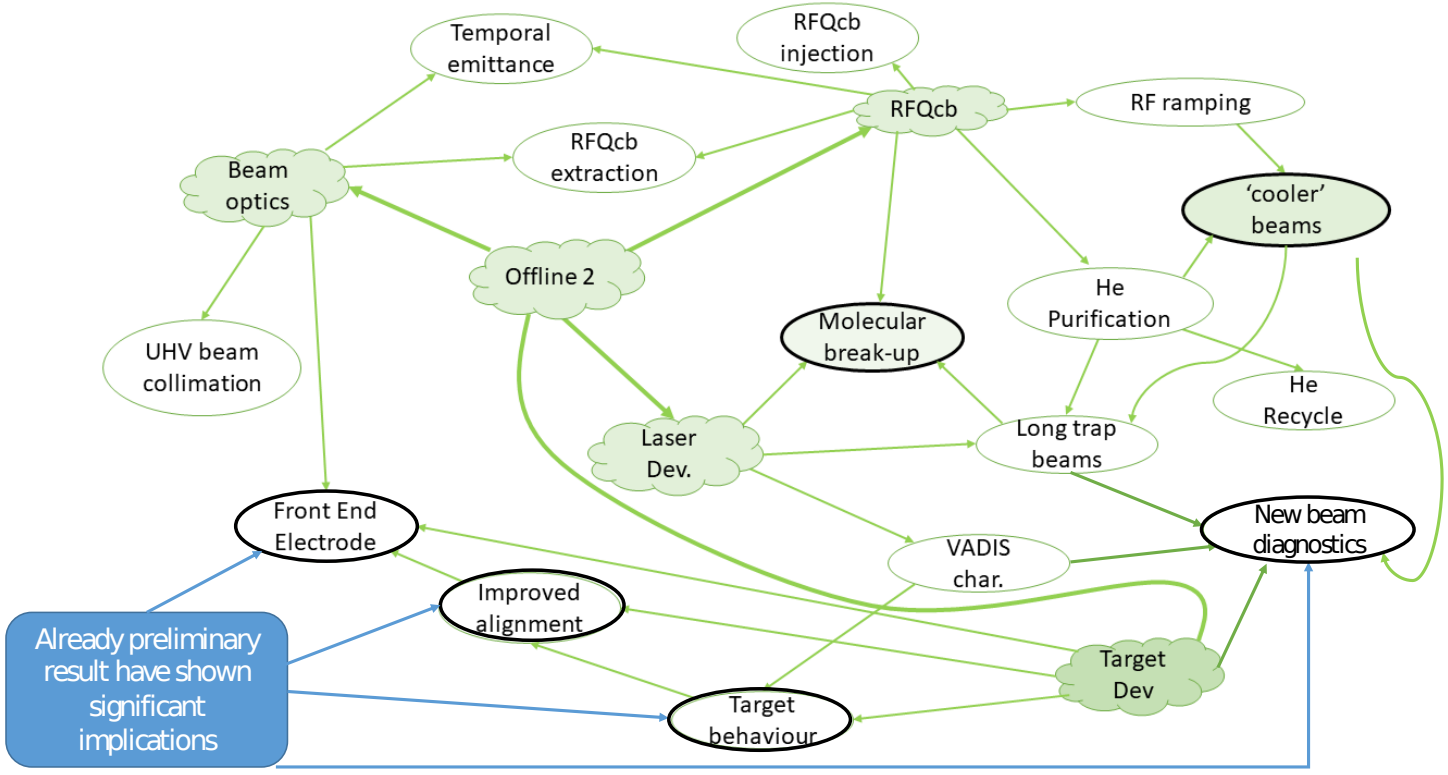


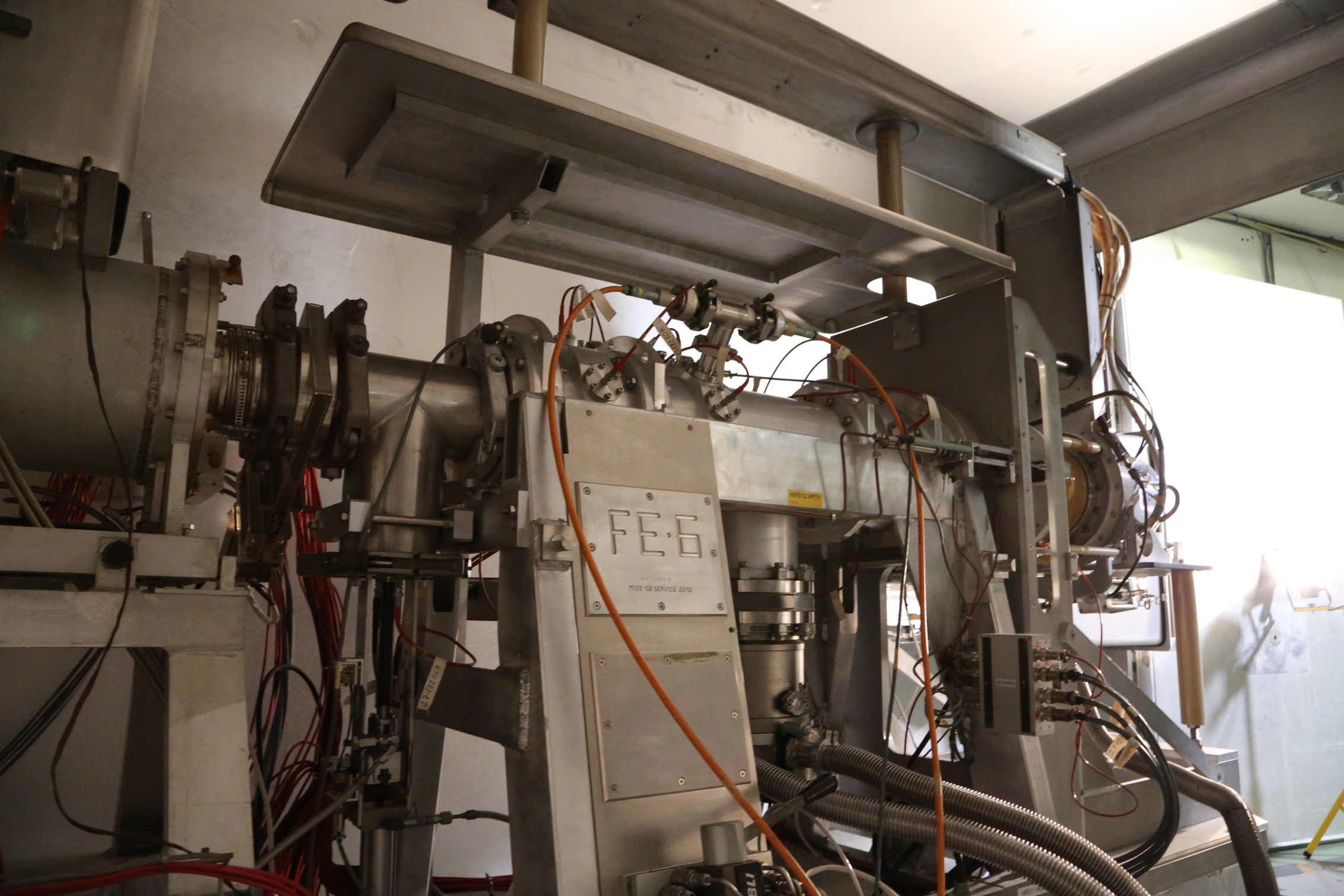


Status of OL2



Proposed investigations of high impact to ISOLDE

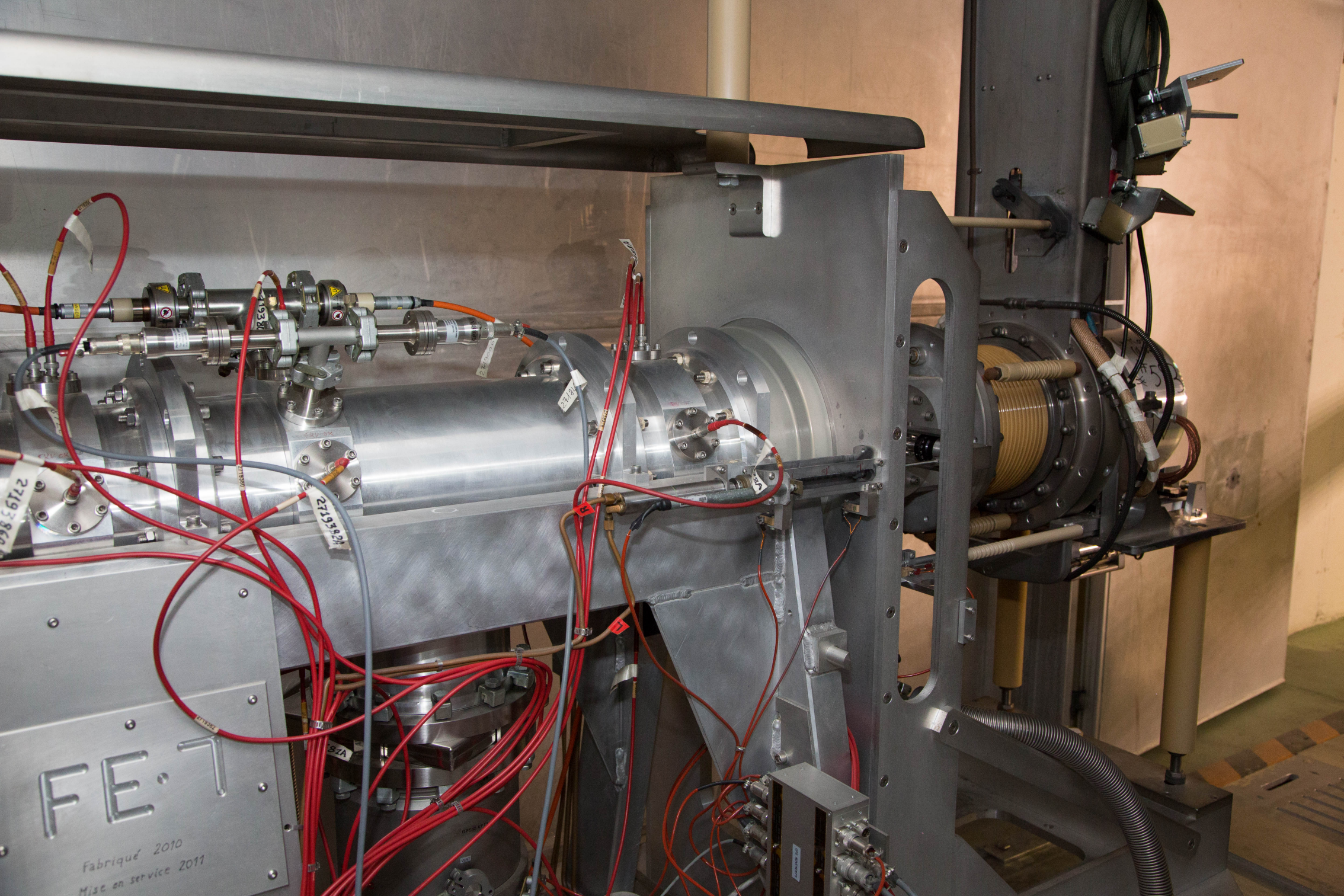



FE·6
MISE EN SERVICE 2010

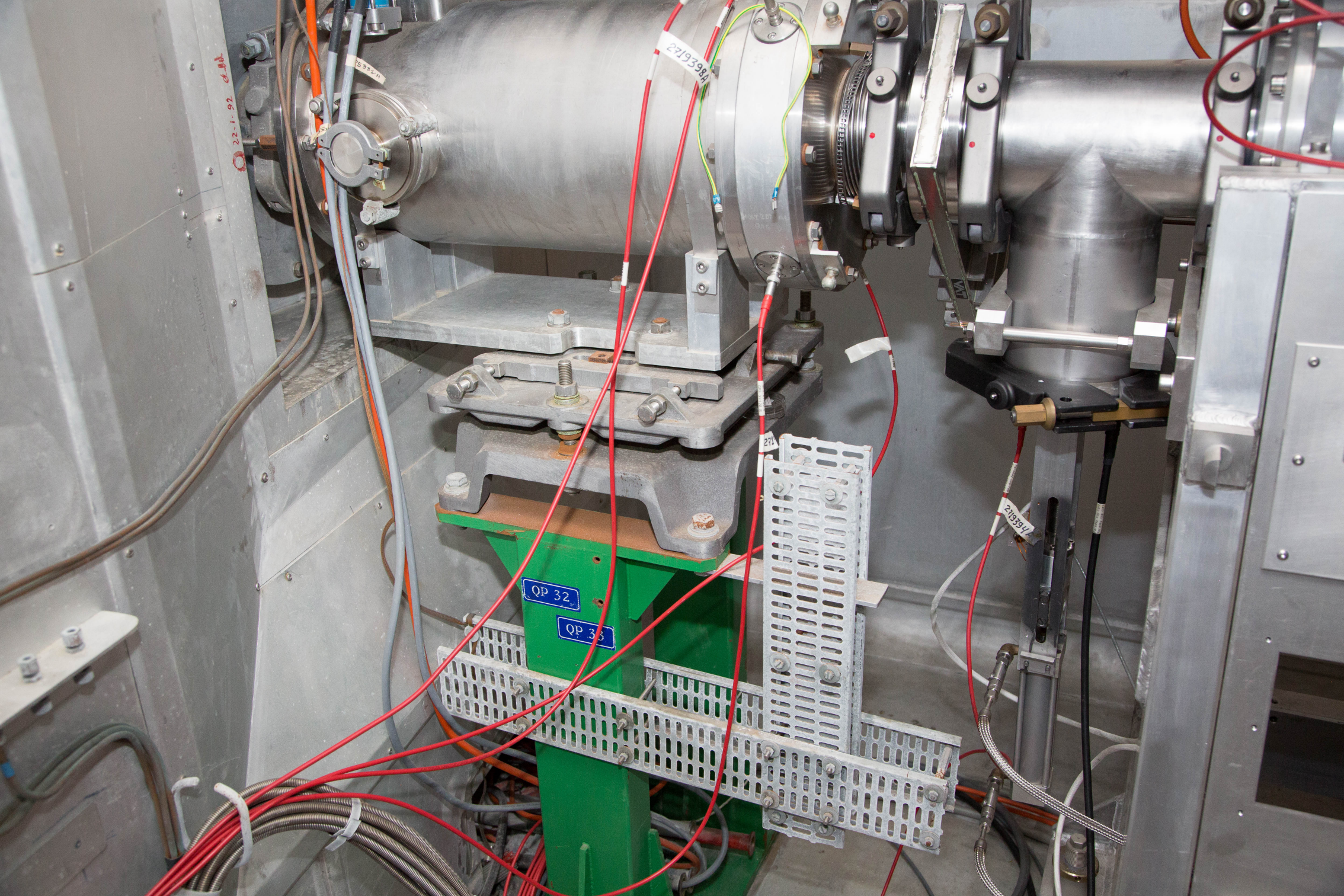

HRS PPZC

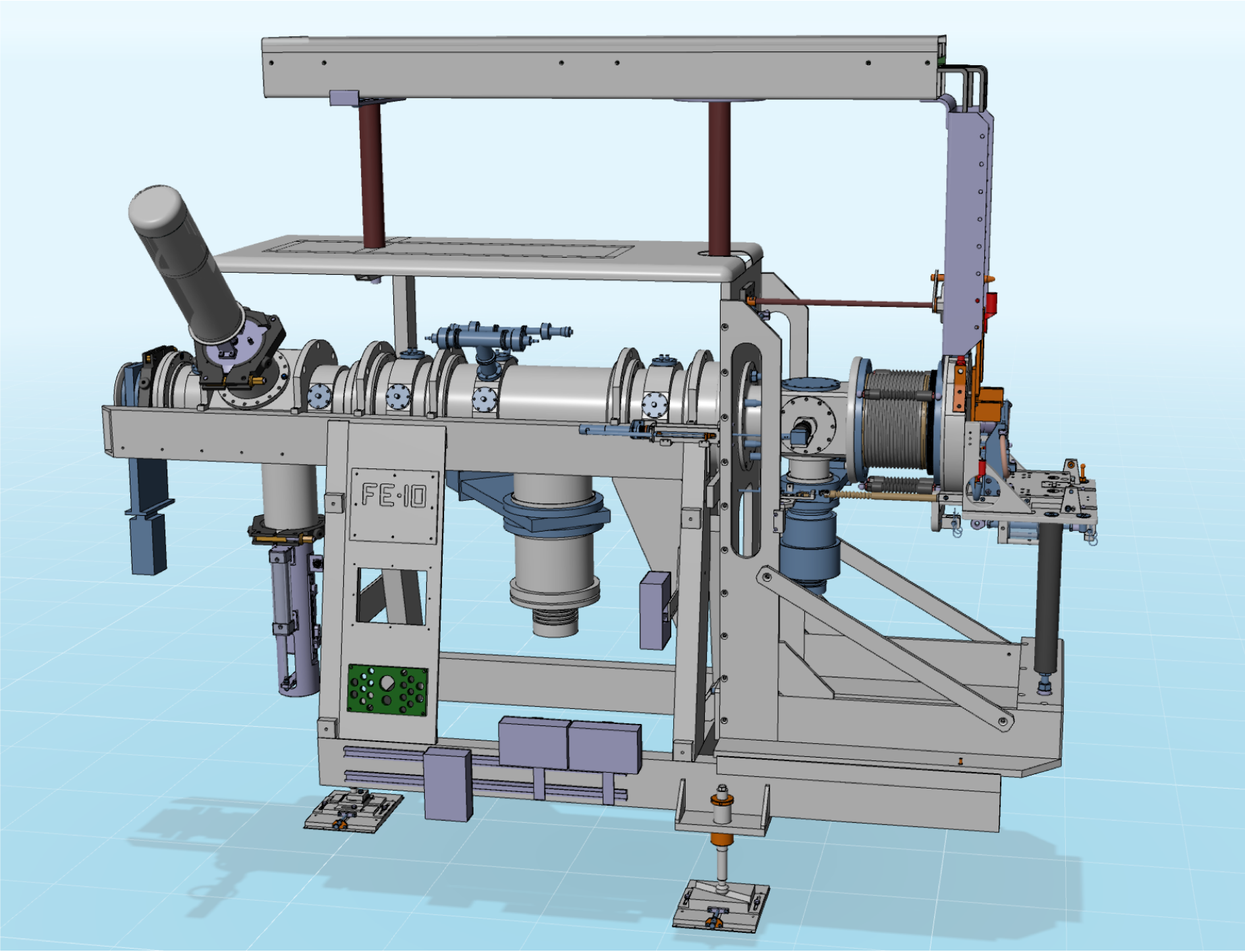

FE-6

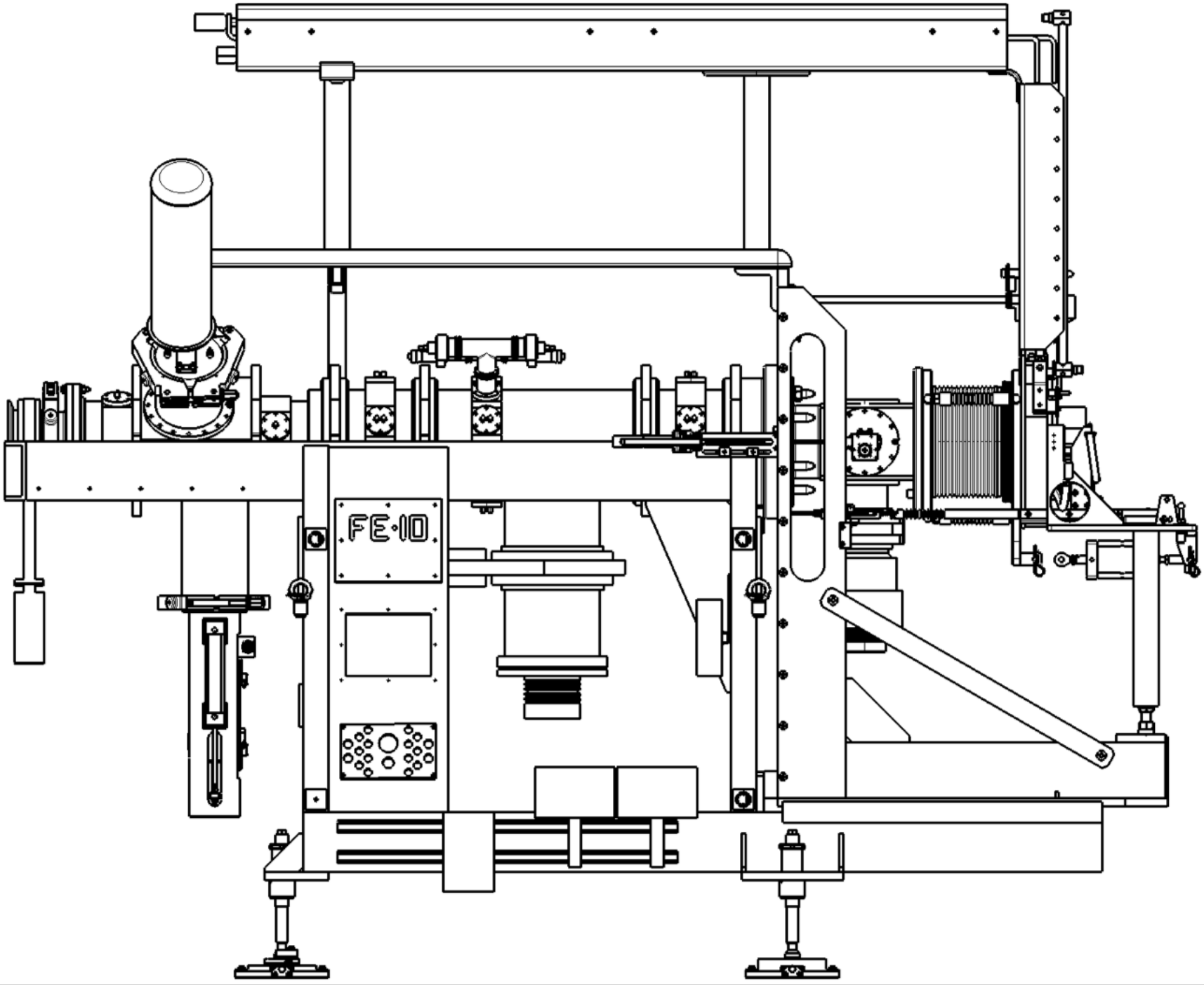

V21B
TP21
HRS20.VVH1

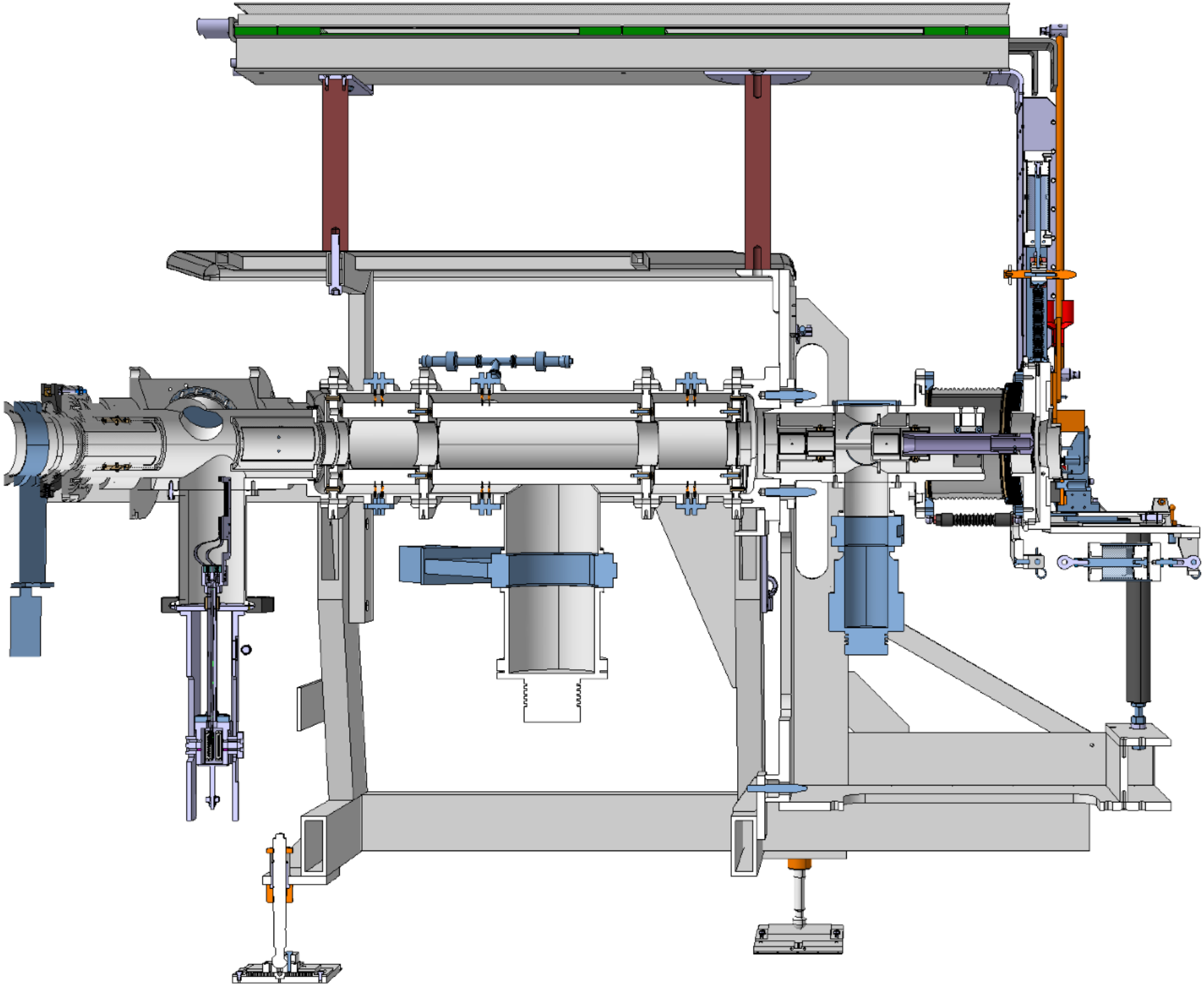

FE·T
Fabriqué 2010
Mise en service 2011

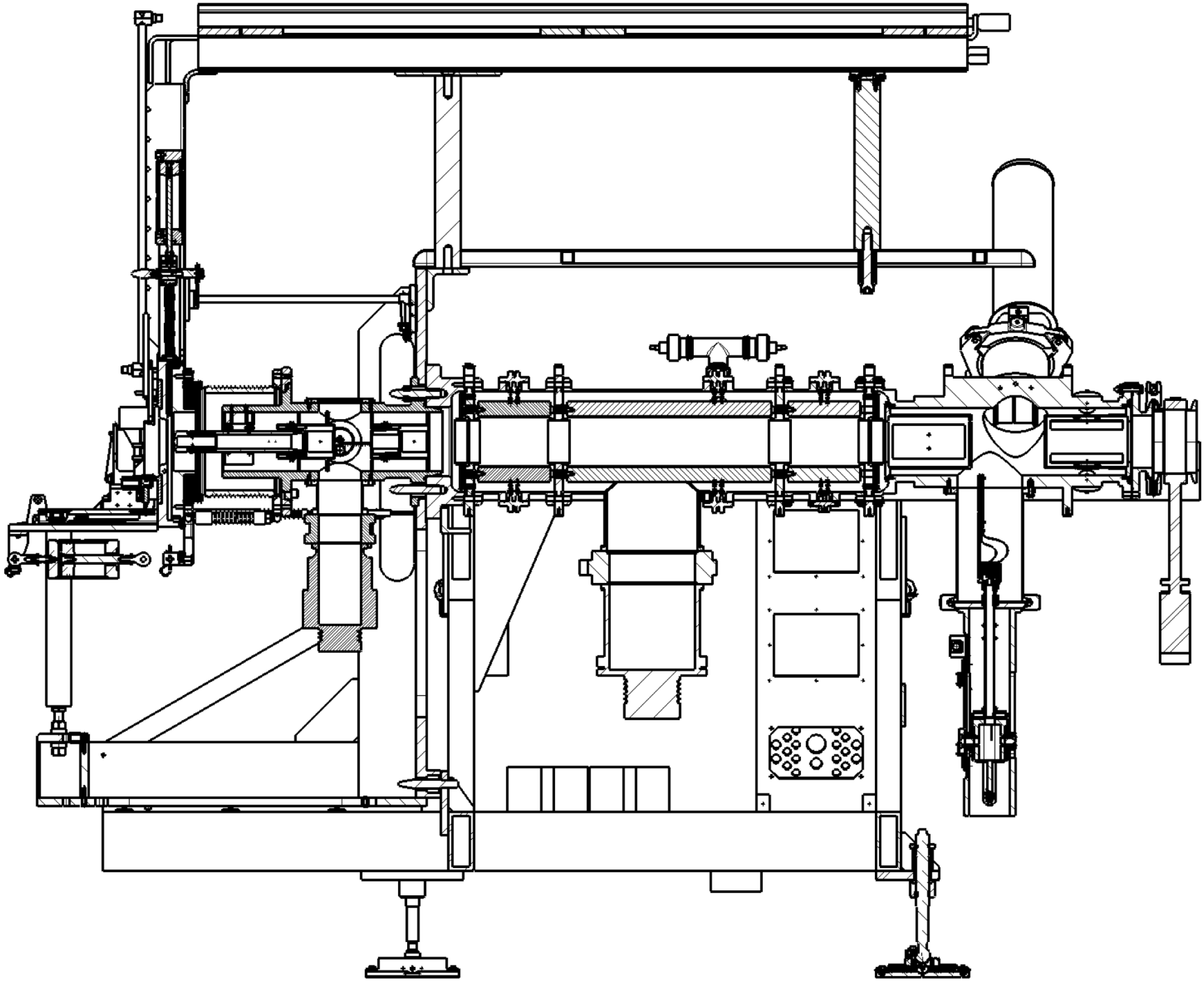
8
9
10
11
21
22
30
31
32
33
7193
271939
2719458A
2719455A
POT x3
Extract SW x2
Faraday cup SW
Spare
Spare
2719392

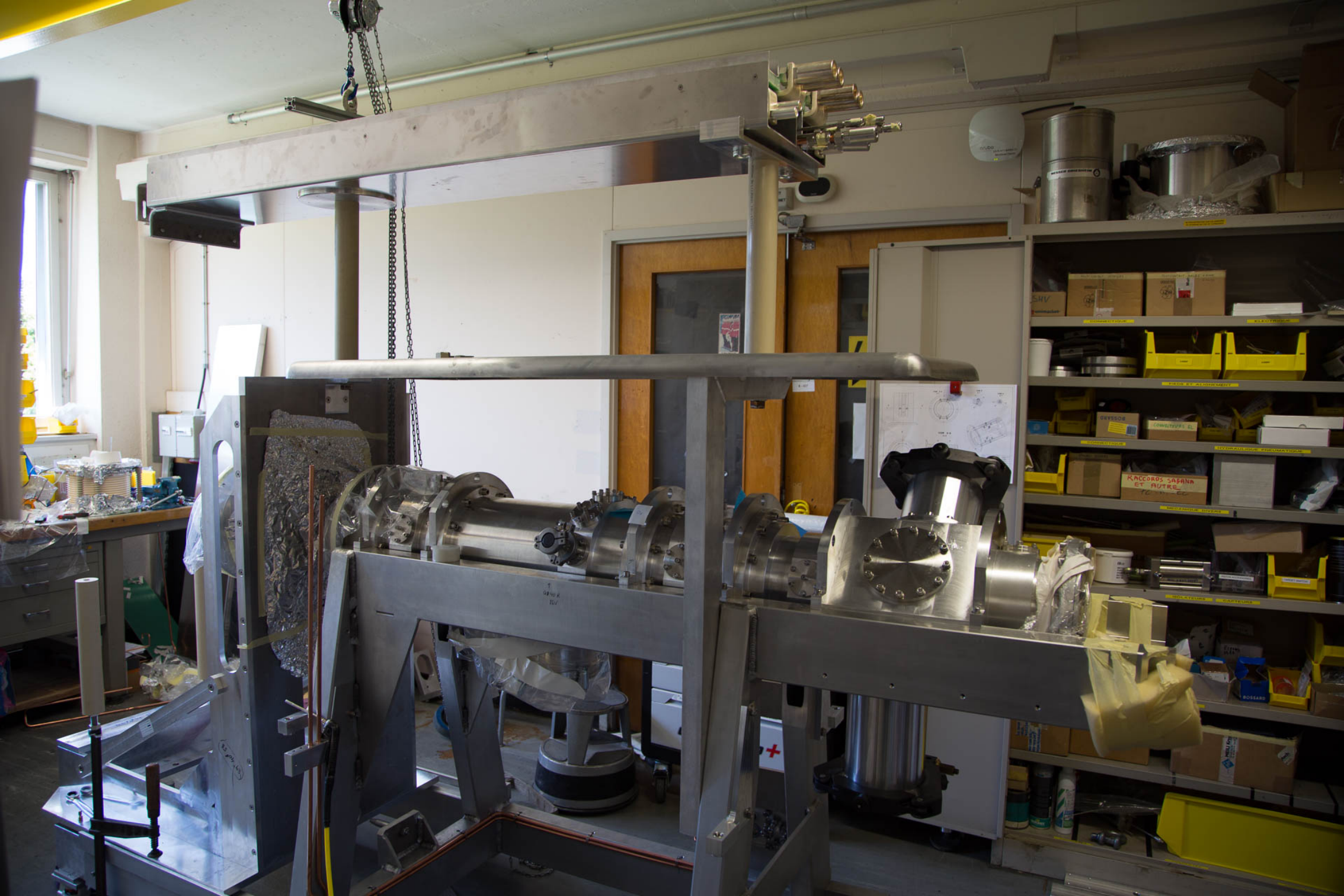

QP 32
QP 33


FE-10

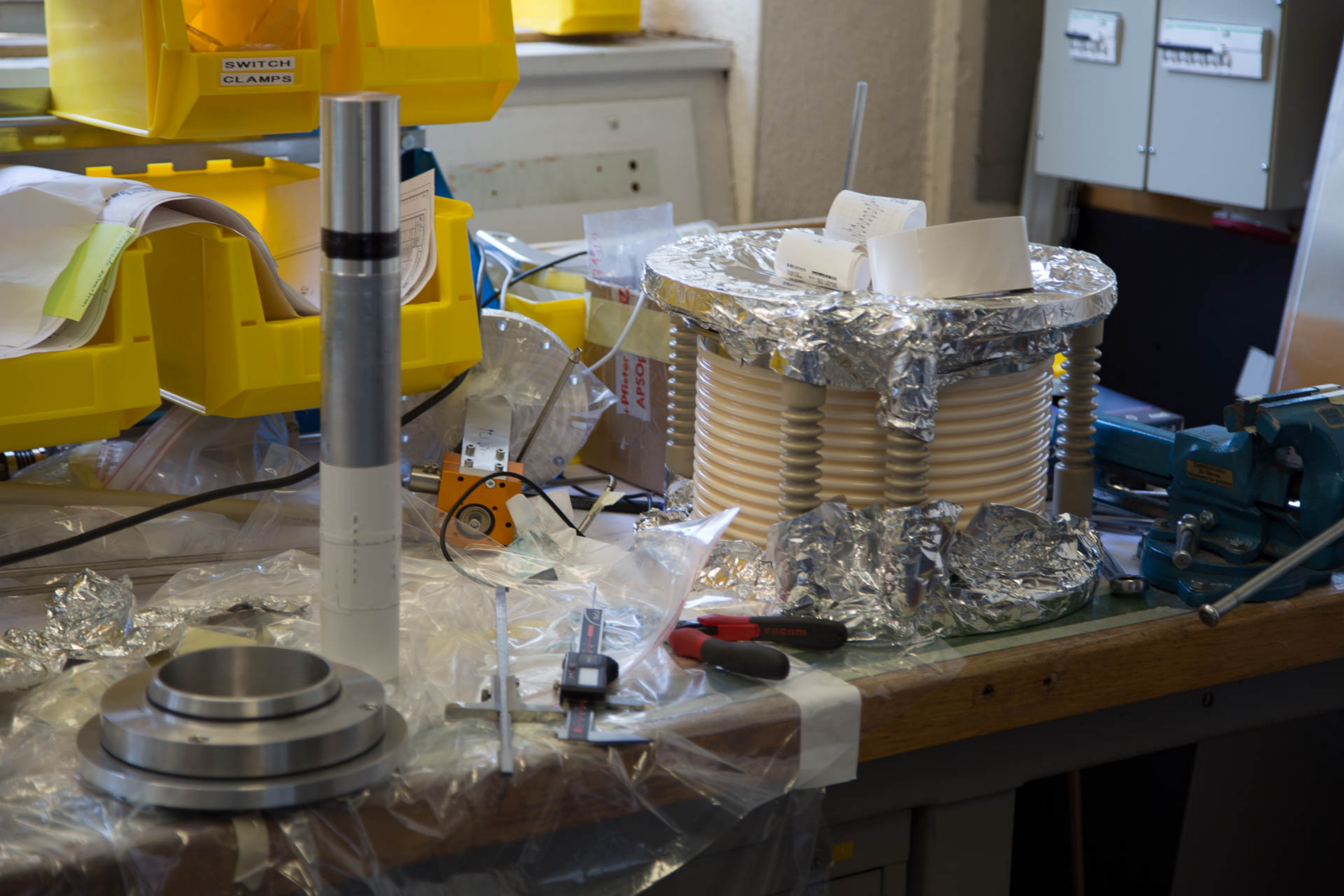

FE-10

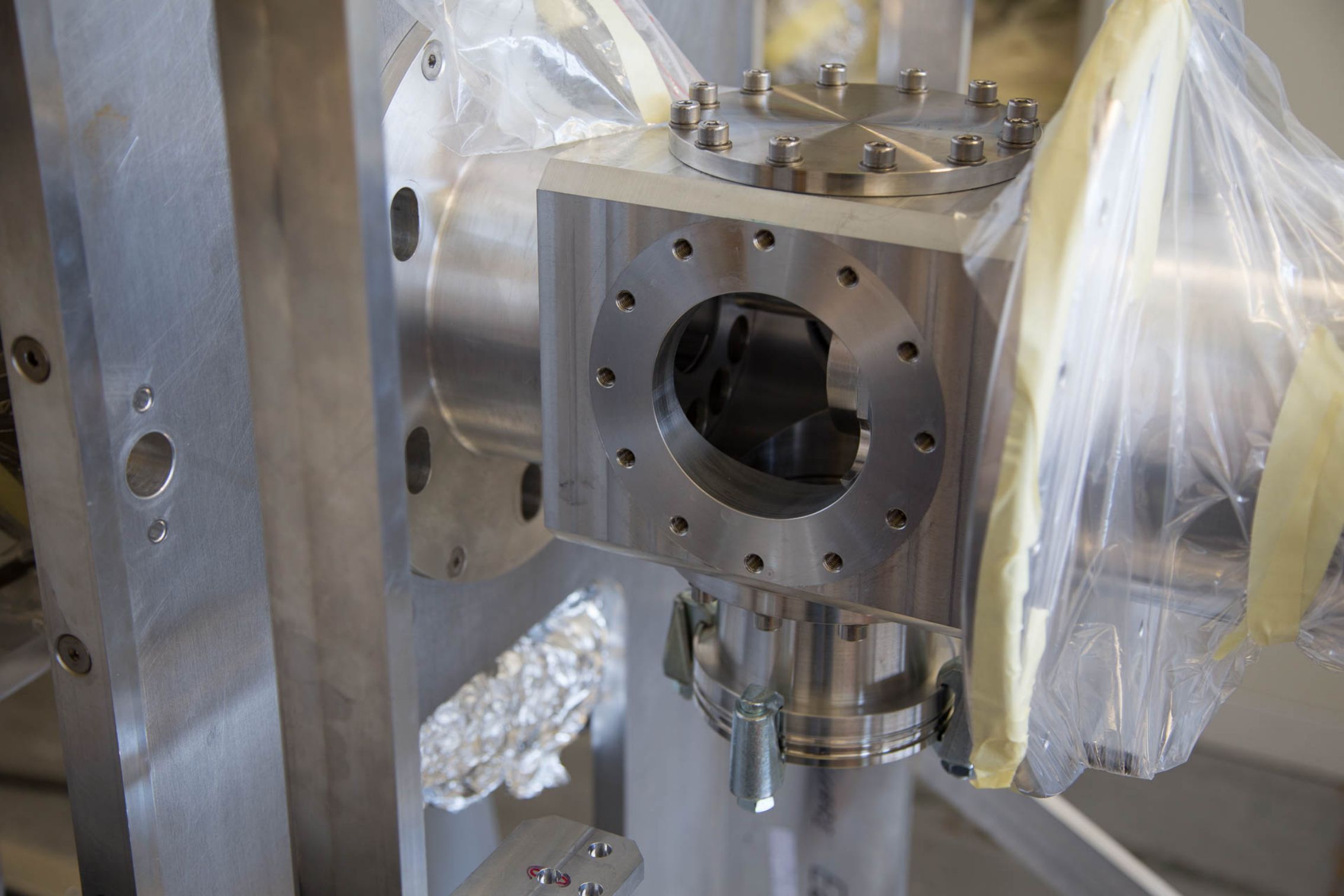




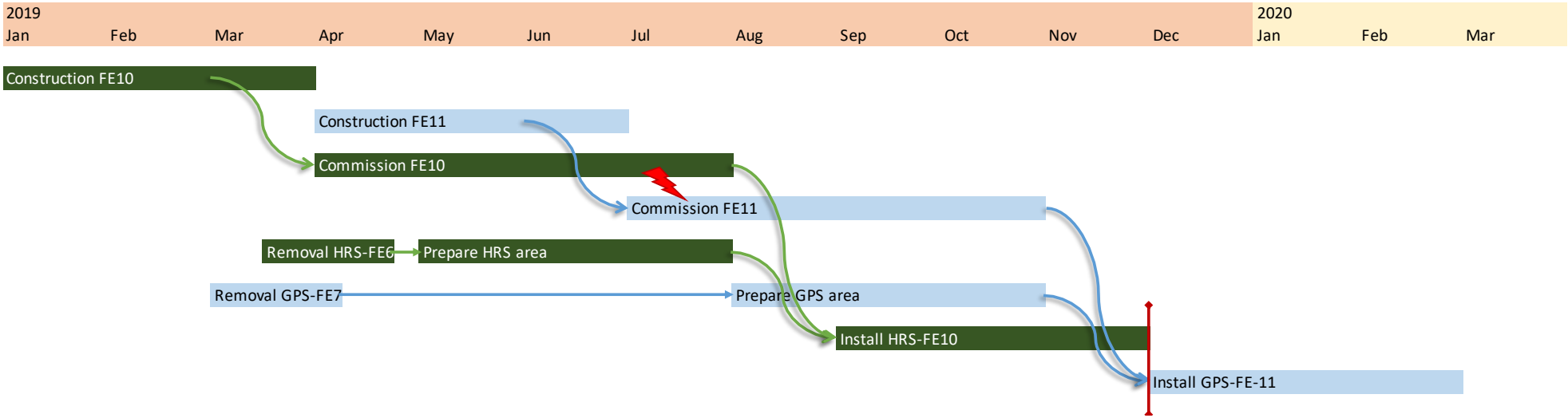

RACCORDS SABANA
ET AUTRE


ATTENTION
HAUTE TENSION
DANGER
facom


SWITCH
CLAMPS




JOINTS FE6
COLLIMATEUR
REPELLER
Supp. Contact
SOUPAPE
Vis - Outils
PORTE ECHANTILLON
CONTACTS
BOUCHONS
O-rings
DEBOUCHONNEUSE
+ Divers
CONTAINERS
Garant


2019
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2020
Jan
Feb
Mar
Construction FE10
Construction FE11
Commission FE10
Commission FE11
Removal HRS-FE6
Prepare HRS area
Removal GPS-FE7
Prepare GPS area
Install HRS-FE10
Install GPS-FE-11