

GLAD status, upgrade &

R3B Collaboration Meeting
20231106

Mainz



H. Simon •
GSI Darmstadt

Remaining issues:

- **Field maps** → Based on Valeriis field maps inconsistencies with tracker have been found (M . Heil / A Kelic-Heil)
- **Dedicated mapping** Q2/2022
- ~ Mapping from front-side 06/2023
- Summerstudent analysis (via V. Panin)
 - **Indication for remanent magnetization (aka hysteresis)**

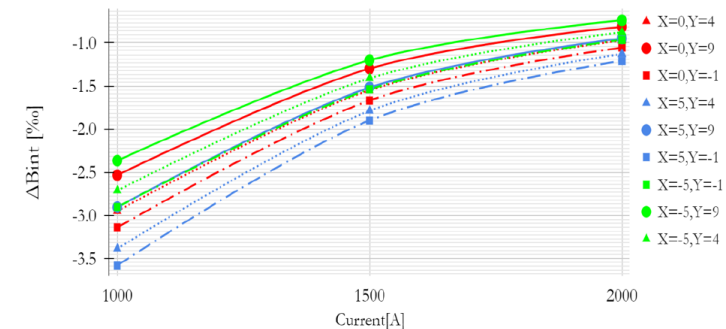


Fig. 9: *Ratio[%]* of the difference in magnetic field between current-up and current-down

Studying field map of the large superconducting spectrometer GLAD

Rika Danjo

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- Analysis in progress (M. Kelic-Heil, M.Heil, V. Panin)
- Decision on Mapping@FAIR for precision tracking based on findings

Contractual status - remaining issues:



- In-kind accepted (France/Germany)
- In-kind contracts closed
- Maintenance contract closed
preventive maintenance and hot-line support (10k€/y)
- Documentation received 05/2022 / approval by QA.

If this refurbishment is effective and done by CEA, the assistance could be extended from to 2025 to 2029 based on the principle mentioned above. **IF THE PRESENT SYSTEM IS TRANSFERRED IN FAIR HALL, CEA WILL NOT PROVIDE ASSISTANCE FOR AND AFTER THE TRANSFER**, considering that many components will be obsolete at the time of transfer.

- Common funds via NUSTAR → ECE/ECSSG (193k€@2005) ok
- FAIR budget allocated, Contract closed
- Work on DAQ system has started
- open issue: PLC based magnet control system



Ref : ATRIUM - 414672
Version : 1



Note

Date : 20/07/08

Nbr of pages : 5

Author : C. Mayri

Subject Recommendations for Glad transfer to FAIR

Diffusion list:

C. Mayri
 W. Korten

J. Allard
 D. Anstett

M. Massinger
 P. Daniel-Thomas

Concerning the timing phase, the study and realization of the new cabinets have to begin at least **1 year before the transfer on the FAIR experiment** (study, purchase of components, assembly, configuration and tests).

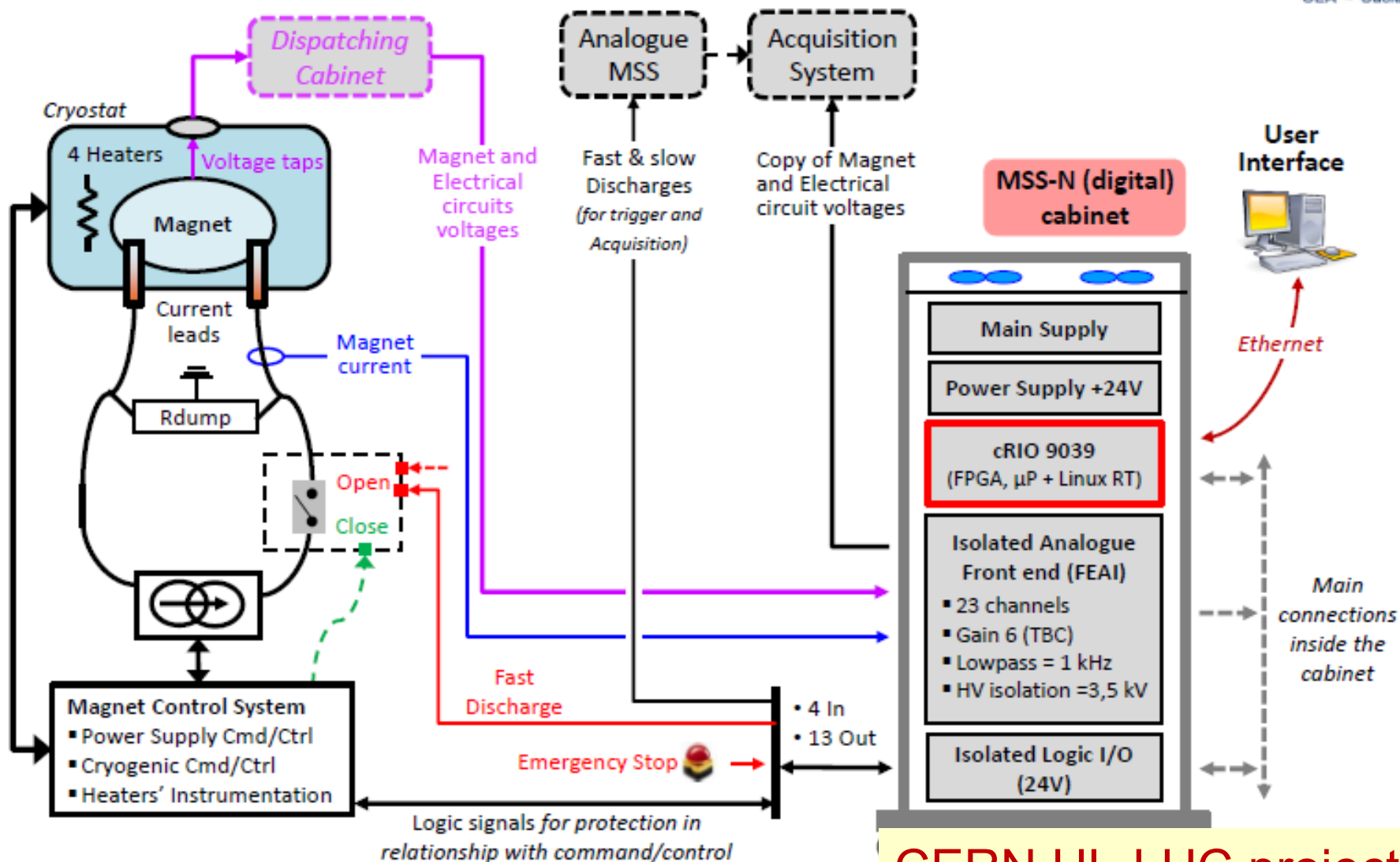
3. Conclusions

In 2025, the whole system will be based on old technology with old materials. To run on Fair during 20 years, the efficiency of the present system cannot be assured. Except some power items, it is strongly recommended to refurbish all the cabinets and to update the data acquisition system for the MSS and the MCS.

Scope:

Cabling, Magnet Control, Magnet Safety System, Software

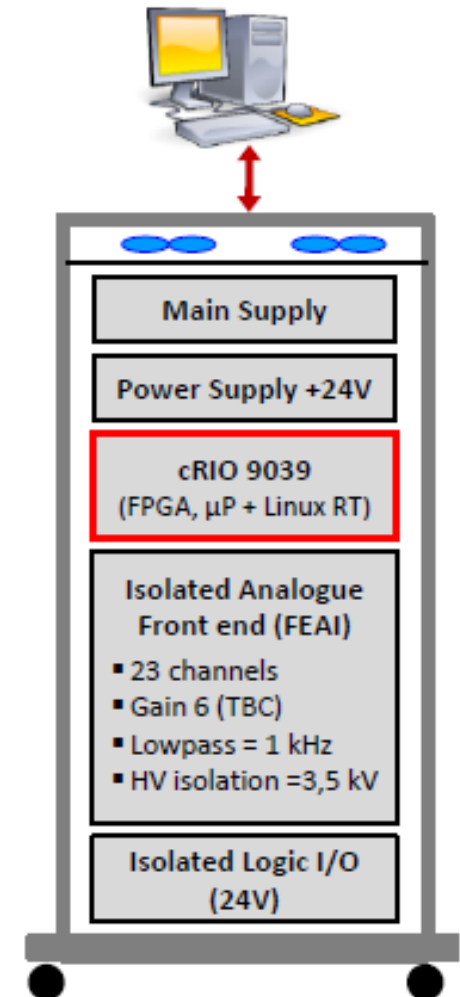
MSS-N (digital): cabinet overview



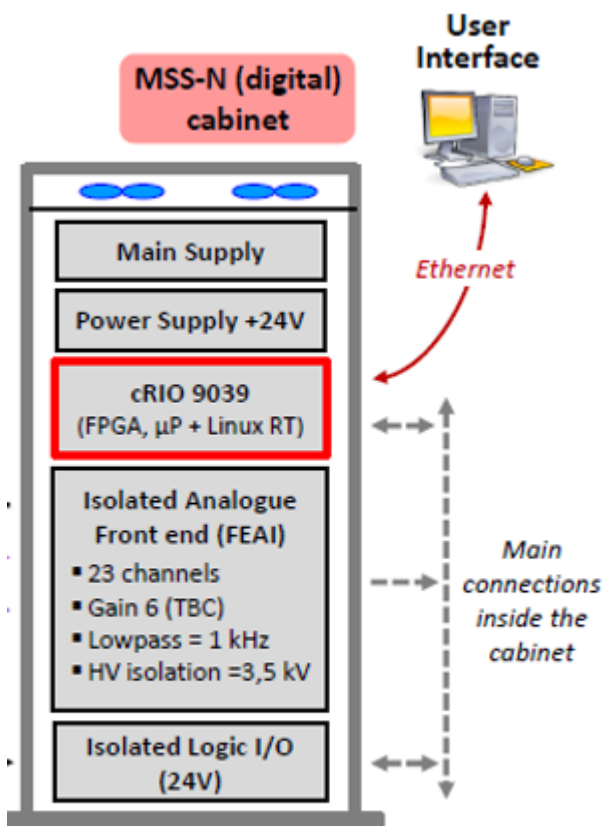
CERN HL-LHC project

Proposed CEA Design for refurbishment

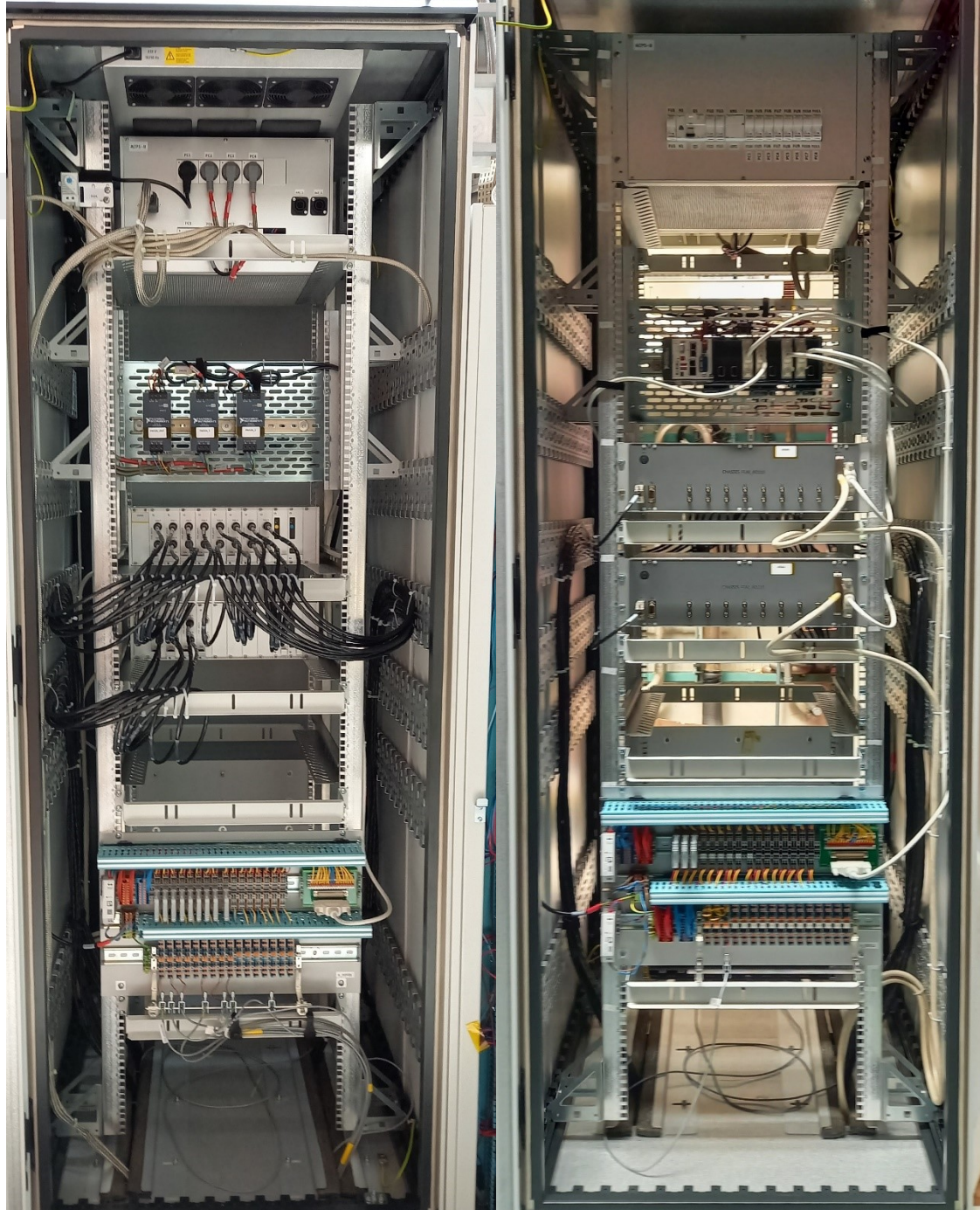
- **The Digital MSS is a new design based on:**
 - Commercial products or software:
 - cRIO 9039, NI 9220, NI 9477, NI 9425, NI PS16
 - LabVIEW (standard, real-time, FPGA)
 - Wago, Phoenix-Contact, Schneider, Legrand, nVent-Schroff
 - Two specific developments:
 - The isolated analogue front-end
 - The MSS software (*from FPGA to UI*)
- **The digital MSS has passed 2 major tests**
 - 3 months running without failure
 - Detection of all quenches during the test of Q4 magnet and no false quench detection.
- **For STAARQ test stand**
 - The digital MSS will be the main MSS
 - The analogue MSS will run in redundancy



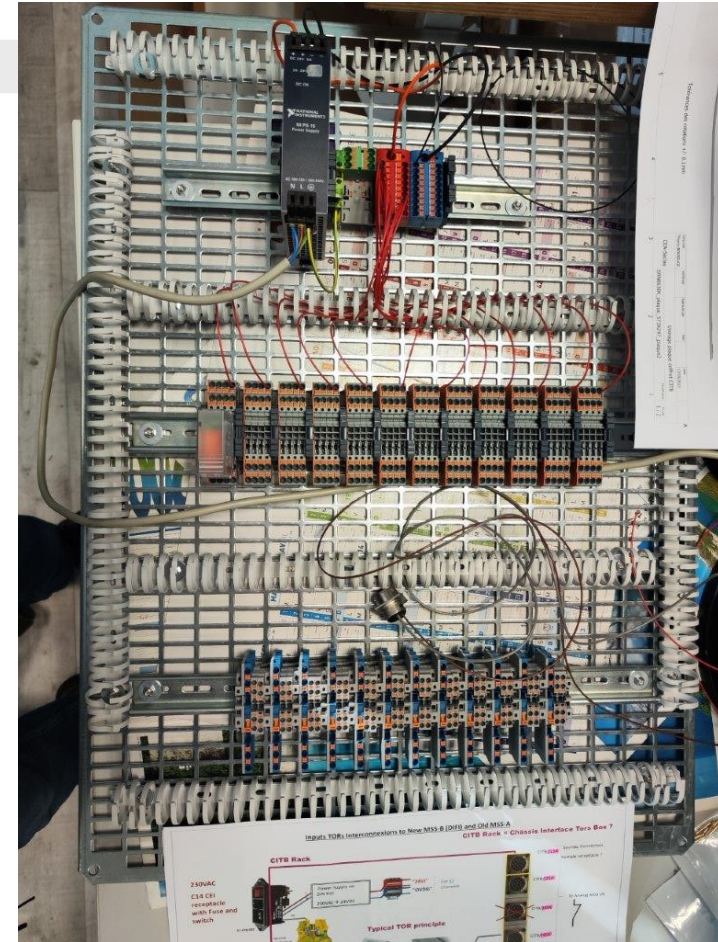
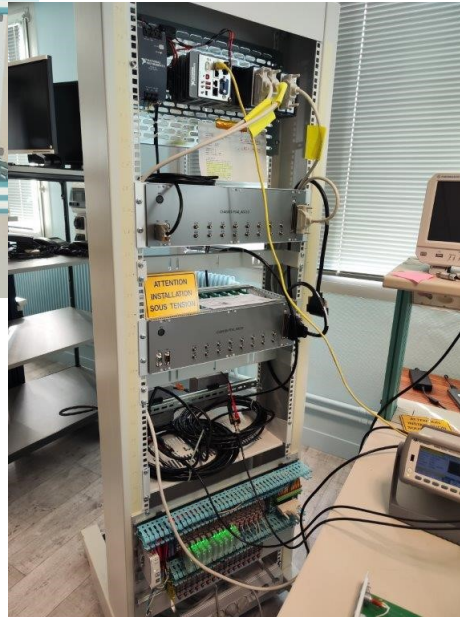
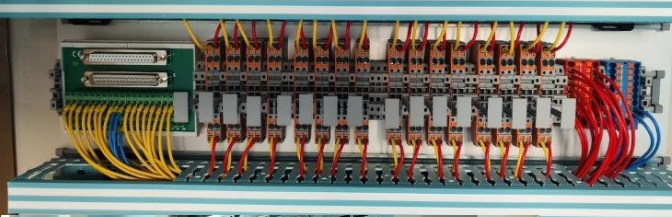
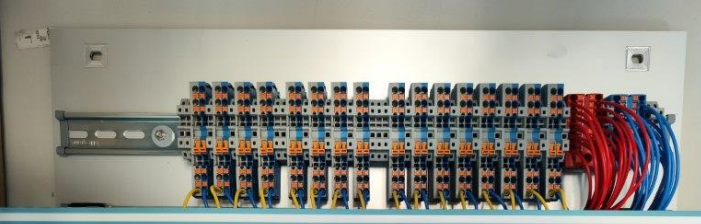
CEA System growing



CERN HL-LHC project



CEA System growing (R³B)



The project is progressing steadily.

- The empty R3B MSS cabinet will be delivered in Saclay in mid-November 2023.
- The last electronic components should be delivered in December 2023. Production of the analogue electronic boards will then begin 01/2024.
- The MSS software can be integrated into a cRIO 9039 or a cRIO 9049. The next step is to program the quench detectors.

- 1) Some components cannot be maintained after 2025. That includes the PLC and the Muscade software.
- 2) The CABTR are operational but cannot be replaced. It is strongly recommended to replace them by CABTF.
- 3) The helium box and the ProfiBus could be replaced by more recent and industrial components : LM510 box and ProfiNet. The helium gauges will be replaced.
- 4) Other spare components like Sipart, heaters, cabinet equipment may be purchased without replacing the installed ones.

Put on hold, can be replaced
as part of preventive maintenance (2025-)

There is a big incertitude on the cable replacement if they are not compatible with Fair safety standards or if they are too short.

Documents scanned and final payment released



- NUSTAR
 - Collaboration
 - Experiments
 - Formal documents
 - LEB infrastructure
 - HISPEC/DESPEC
 - MATS
 - LaSpec
 - R3B
 - GLAD
 - 2766071 (v.1) Design [AID:0002071]
 - 2766072 (v.1) Risk analysis and hazard analysis [AID:0002071]
 - 2766073 (v.1) Operating manual / user manual [AID:0002071]
 - 2766074 (v.1) Miscellaneous [AID:0002071]
 - 2766075 (v.1) Design [AID:0002073]
 - 2766076 (v.1) Risk analysis and hazard analysis [AID:0002073]
 - 2766077 (v.1) Operating manual / user manual [AID:0002073]
 - 2766078 (v.1) Miscellaneous [AID:0002073]
 - 2766079 (v.1) Design [AID:0003150]
 - 2766080 (v.1) Risk analysis and hazard analysis [AID:0003150]
 - 2766081 (v.1) Operating manual / user manual [AID:0003150]
 - 2766082 (v.1) Miscellaneous [AID:0003150]
 - 2766083 (v.1) Design [AID:0003151]
 - 2766084 (v.1) Risk analysis and hazard analysis [AID:0003151]
 - 2766085 (v.1) Operating manual / user manual [AID:0003151]
 - 2766086 (v.1) Miscellaneous [AID:0003151]
 - 2766087 (v.1) Design [AID:0003152]
 - 2766088 (v.1) Risk analysis and hazard analysis [AID:0003152]
 - 2766089 (v.1) Operating manual / user manual [AID:0003152]
 - 2766090 (v.1) Miscellaneous [AID:0003152]
 - 2766091 (v.1) Design [AID:0003153]
 - 2766092 (v.1) Risk analysis and hazard analysis [AID:0003153]
 - 2766093 (v.1) Operating manual / user manual [AID:0003153]

Info More info

Documents Structure Used in Access rights History

#	Id	Title	Files	Status	Created ...	Author	Docume...	Tags
10	2766071 v.1	Design [AID:00020...		In Woi	2022-07-2	Contribut	Engine...	
20	2766072 v.1	Risk analysis and ...		In Woi	2022-07-2	Contribut	Safety...	
30	2766073 v.1	Operating manual /...		In Woi	2022-07-2	Contribut	Operati...	
40	2766074 v.1	Miscellaneous [AID...		In Woi	2022-07-2	Contribut	Engine...	
50	2766075 v.1	Design [AID:00020...		In W				
60	2766076 v.1	Risk analysis and ...		In W				
70	2766077 v.1	Operating manual /...		In W				
80	2766078 v.1	Miscellaneous [AID...		In W				
90	2766079 v.1	Design [AID:00031...	@ 9	Engl				
100	2766080 v.1	Risk analysis and ...		In W				
110	2766081 v.1	Operating manual /...		In W				
120	2766082 v.1	Miscellaneous [AID...	@ 1	In W				
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140	2766084 v.1	Risk analysis and ...		In W				
150	2766085 v.1	Operating manual /...		In W				
160	2766086 v.1	Miscellaneous [AID...		In W				
170	2766087 v.1	Design [AID:00031...		In W				

Info

Description: Complete design documentation, incl. drawings, schematics, BoM, calculations, etc.

External reference: AID:0003150, PSP:1.2.5.1.1.2

Keywords:

Details

Local administrators: [List of Administrators](#)

Equipment code:

Context: FAIR-N-FORMAL-DOCS

Release procedure: FAIR-AL

Context for formal documents of the NUSTAR collaboration

Approval by Approval Leader with Engineering Check

Associated Links:

CDN Links:

This page <https://edms.cern.ch/document/2766079/1>

Files

	Name	Size	Last modified date	Last modified by
	ASG_R3B-GLAD_Cold_Mass_General_Documents_Dra	445.2 ME	2022-09-12 13:16:31	K.KRAEMER EXTERNAL
	ASG_R3B-GLAD_Cold_Mass_Lateral_Coils_Drawings.p	20.8 MB	2022-09-12 13:16:31	K.KRAEMER EXTERNAL
	ASG_R3B-GLAD_Cold_Mass_Main_Coils_and_Aluminu	8.5 MB	2022-09-12 13:16:31	K.KRAEMER EXTERNAL
	ETTORE_ZANON_R3B-GLAD_Magnet_Thermal_Shield_	127.6 ME	2022-09-12 13:16:32	K.KRAEMER EXTERNAL
	ETTORE_ZANON_R3B-GLAD_Satellite_Thermal_Shield	12.5 MB	2022-09-12 13:16:32	K.KRAEMER EXTERNAL
	SDMS_R3B-GLAD_Dossier_Construceteur_Partie_01_Dc	42.4 MB	2022-09-12 13:16:32	K.KRAEMER EXTERNAL
	ALSTOM_CD.zip	826.5 ME	2022-09-12 15:07:03	K.KRAEMER EXTERNAL
	2011_TDR_R3B_GLAD_V2-1.pdf	6.1 MB	2022-09-14 17:59:11	ALEXANDER JOSEF HERLERT
	2011_TDR_R3B_GLAD_GSInterfaces.pdf	3.8 MB	2022-09-14 17:59:12	ALEXANDER JOSEF HERLERT

Page 1 of 1 Total: 9 (displaying 1 - 9)

More info

GSI-CEA final delivery contract curing increased project cost

- non conformity: „documentation“ now ok

Control room in refurbishment

See Daniels Talk

Maintenance manual for cold start could be checked



WUST (IK: Local Cryogenics Super-FRS)

PSP Codes, AIDs, and CIDs

1.2.5 - R3B

1.2.5.1.1.3 - infrastructure (magnets)

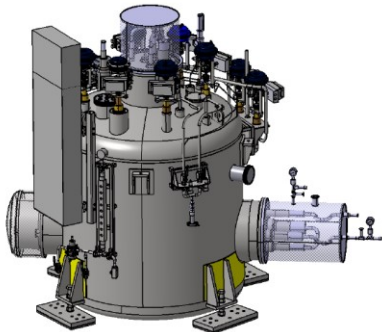
1.2.5.1.1.3.2 - Flex line GLAD (AID:0002071; CID:12005001326)

1.2.5.1.1.3.3 - GLAD feedbox (AID:0003152; CID:12005001036)

1.2.5.1.1.3.4 - GLAD warm piping (AID:0003008; CID:12005001333)

Flex line details still open
(partly) covered by SE IK

→ e.g. tender via GSI



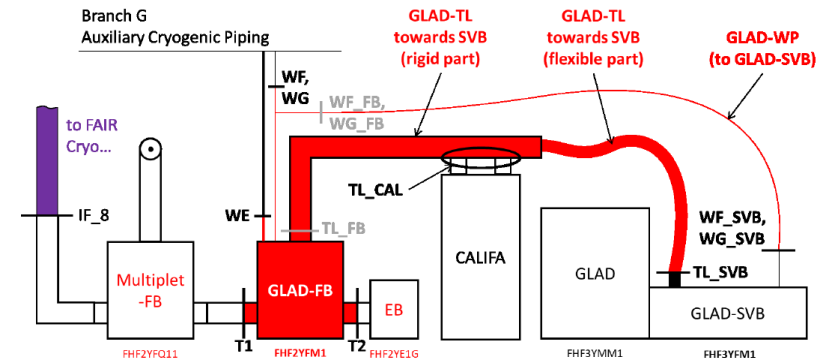
- Remaining assemblies to be welded to the feed box.
- Instrument routing and tubing to be done
- Actuators to be connected to the valves.
- Feed box to be prepared for the next stages of testing and FATs.

	Document Type:	Document Number: F-DS-CRY-en_K_0040	Date: 06.09.2023
	Detailed Specification	Template Number: Q-FO-QM-0005	Page 1 of 22

F. Wamers + CMO/CRY
T. Hackler, D. Körper et al.
C. Mayri/R. Vallcorba

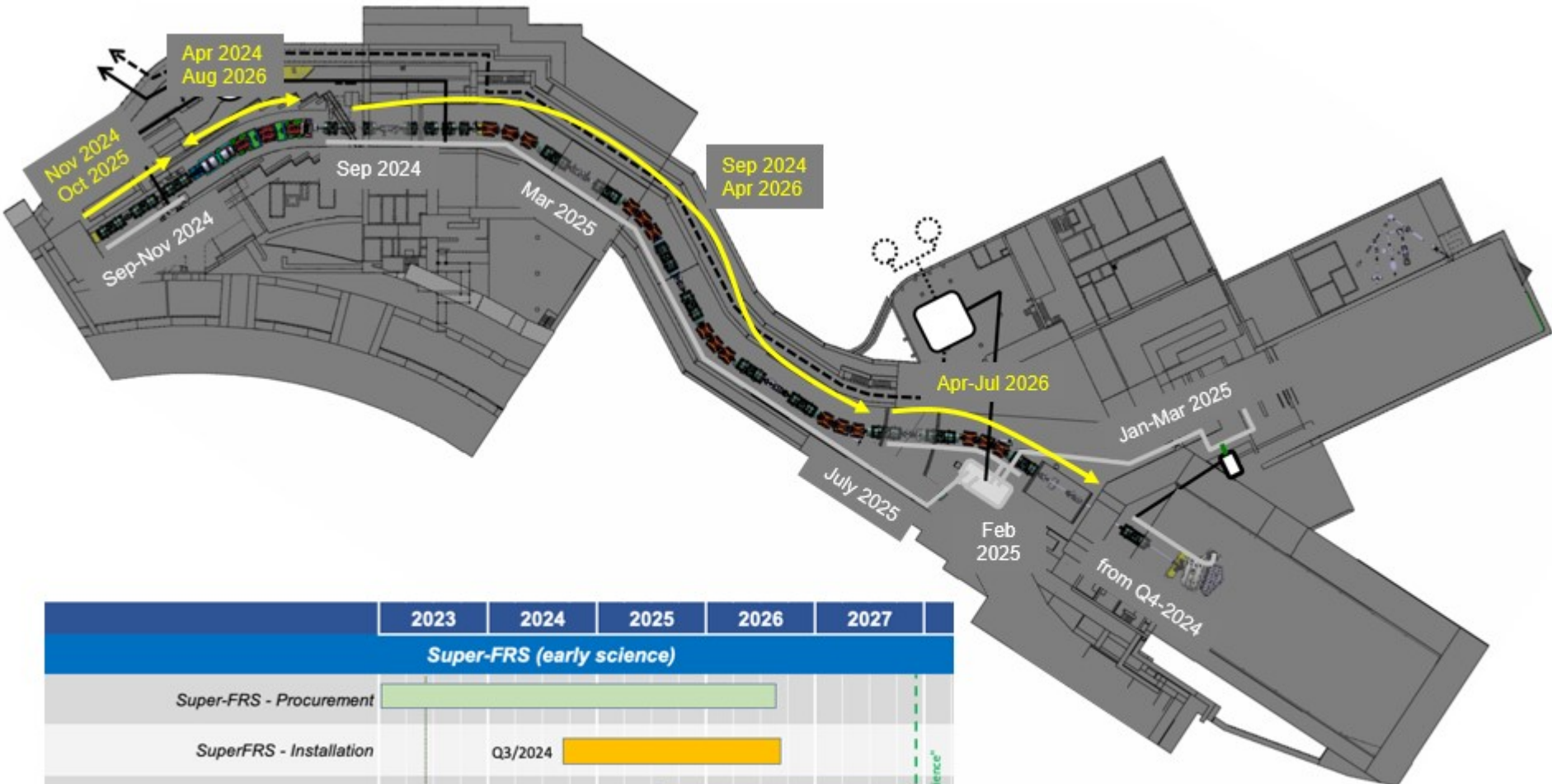
Document Title:	Super-FRS Local Cryogenics – Connection Components for GLAD
Description:	Specification of the detailed functional requirements of the Feed Box, Transfer Line, and Warm Piping for the connection of the "GLAD" experiment magnet to the Super-FRS Local Cryogenics infrastructure
Division/Organization:	COM/CRY
Field of application:	FAIR GmbH and GSI GmbH

Schematically, the scope of this specification including its main interfaces, is shown in Figure 2.



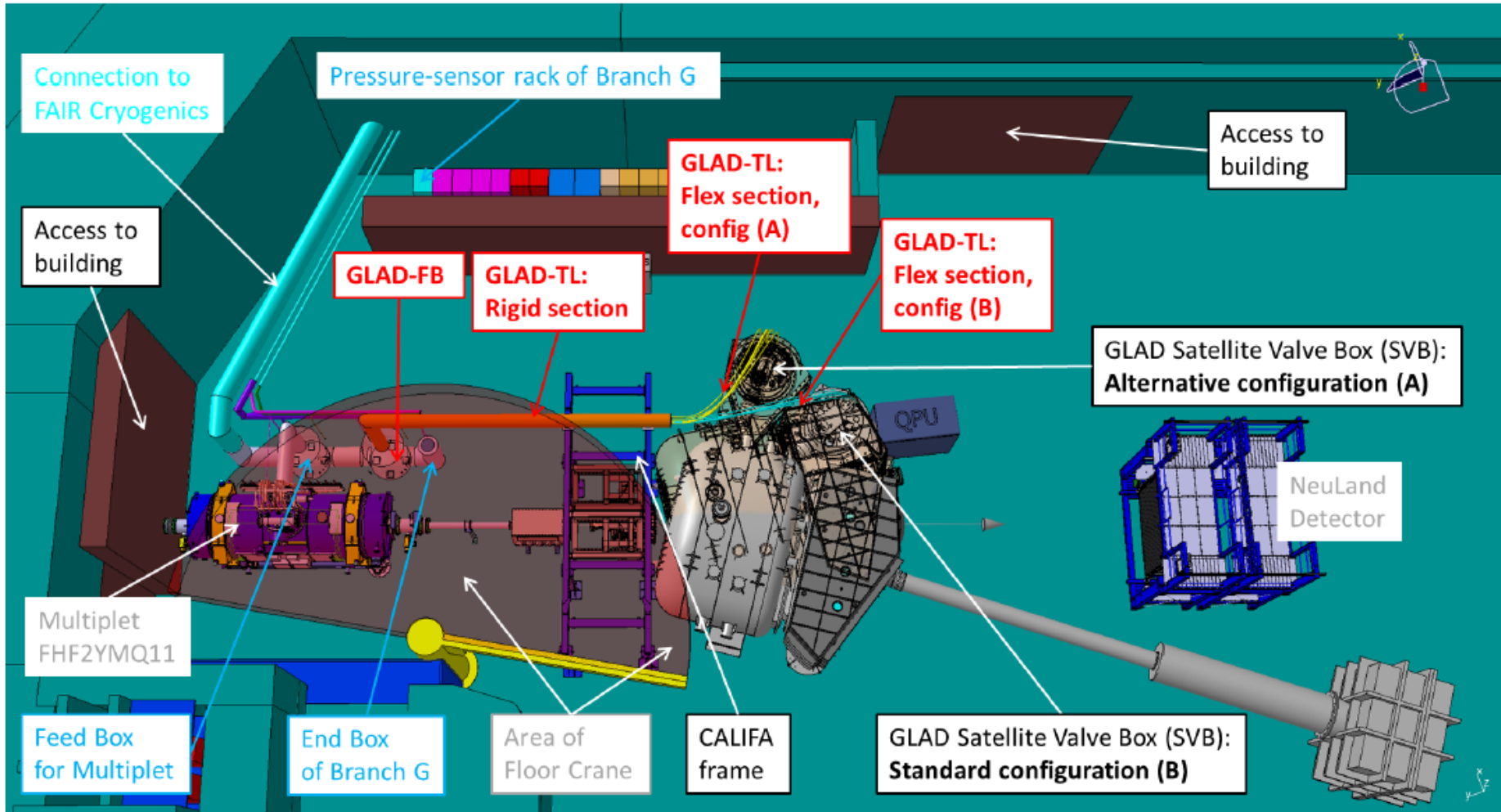
Prod. Readiness of first branch-T

Overall schedule



	2023	2024	2025	2026	2027
Super-FRS (early science)					
Super-FRS - Procurement	[Green bar from start of 2023 to end of 2026]				
SuperFRS - Installation		Q3/2024	[Yellow bar from Q3/2024 to end of 2026]		
SuperFRS - Commissioning			Q3/2025	[Yellow bar from Q3/2025 to end of 2027]	
Early Science - ready for beam (M11)					Q3/2027 ◆
Early Science - ready for operations (M12)					Q4/2027 ◆

Overview



Summary

- Control room refurbished, separated DAQ and GLAD part
- Works on new MSS progressing
- Magnet operated flawlessly several times
 - last test (2800A) – 20231106
 - next test 20231117 TPC A. Obertelli
- Open issues:
 - Find resources to replace PLC based MCS
 - Finalize flex line (incl. supports) scheme