TESTING POSSIBILITIES @ CERN

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WP10. EUCARD 2 Task 4 - HTS Magnet Tests, 26th of November 2014

Testing in the SM18

Evolution need of the set up

Present set up with priorities
New power supply of 10 kA with energy extraction system and maybe a positioning switch
HFM cryostat and cooling system, 20 kA CL
24 nr. Of power supply of 600 A and a space of 60 m aligned to the feed box
New power supply of 30 kA with energy extraction system and new cryostat and cooling concept
New power supply of 30 kA and energy extraction , quench protection system on the horizontal benches
Space, for the STRING: power supplys + magnets and the link with DFB and the EE system

HL LHC string with 100 m of Sc link cooled with feed box and powered by DFB (6x 3 kA 9x 120 A 1 x 11 kA 2 x 25 kA) 45m including D1 550 mm diameter

	Fresca 2 dipole with	2 pairs of HTs current le		a 2 dipole with insert (10 kA)	
	HL LH	C QXF in verthelfic QXF	in herizontal (25 kA) 10 or 2	Series HL LHC QXF in horizor 25 kA) 10 or 20 tests till 20	
HL LHC 11T in v	ertical (6 tests)		HL LHC 11T in horizon	tal	
HFM SI		EUCA	RD2 + 5T????		
Sc link 20m up to 20 kA powered by the feed box Sc link 20m 600 series powered by the box and 2 kA	feed (powered individually with 2		Sc link STRING config	guration with 3x 20 kA,9 x 120 A, 6 x 3	00 A circuit
	Standar	d LHC magnets (MQ,	Correctors) in vertical cryc	ostat	
Standard LH(Spare magnets (MB, S	SS, S4, USA magnets,	ondulators, connection cr	ostats ect) in horizontal p	osition

2017

2018

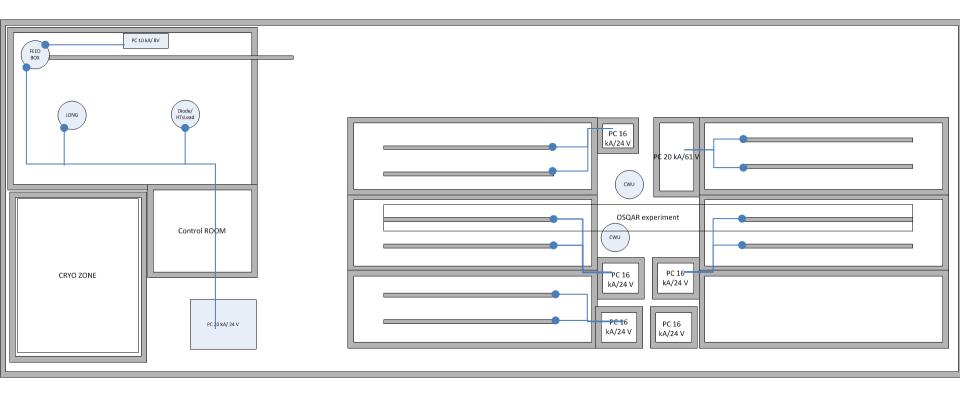
2019

2014 2015 2016 Projects needing cold powering test

6 kW cryo plant

2 vertical cryostats: LONG and DIODE 1 Feed box x 20 kA 20 kA, 2 kA, 600 A PC What to test? CLo: MQ1, MQXC1,SMC3b,SMC_11T1 CD/CCL: Diodes,13 kA and 6 kA LHC Leads SFB: Sc link HB: Osqar magnets, 1MB

10 horizontal benches A,B,D,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC

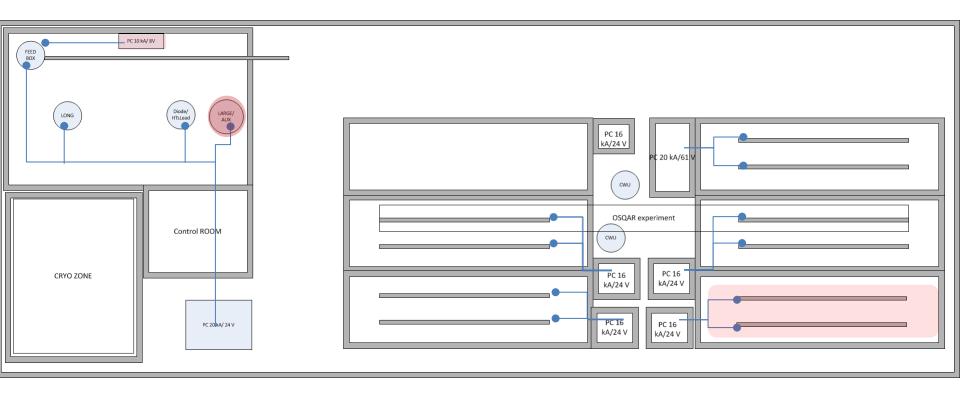


6 kW cryo plant

3 vertical cryostats: LONG, DIODE, LARGE
1 Feed box x 20 kA
20 kA, 2 kA, 600 A PC

What to test? **CLo**: MQ, MQXC2,RMC1, SMC_11T2, HQ, 2 x 11T dipole, 1 x twin 11T dipole, TNA **CD/CC**L: Diodes **SFB**: Sc link **HB**: LHC Ondulator, new D1

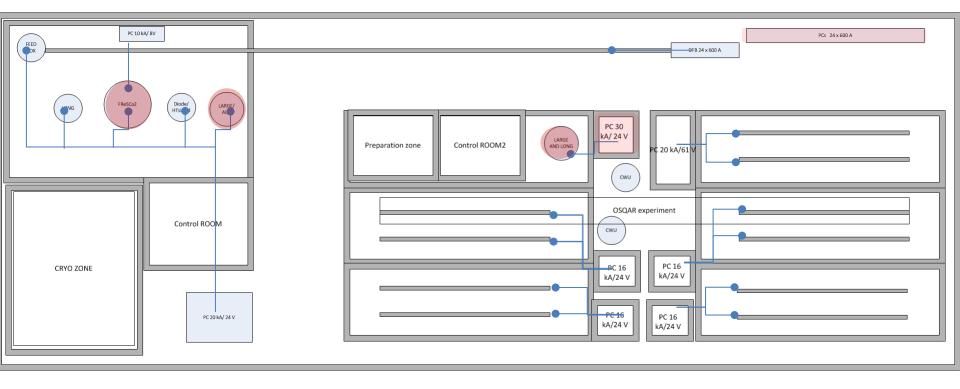
10 horizontal benches A,B,C,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC



6 kW cryo plant ????

What to test? CLo: Cla: CD/CCL: Diodes SFB: Sc link HB: LHC spares

4 vertical cryostats: LONG, DIODE, LARGE, LARGE and LONG, FReSca2 1 Feed box x 20 kA, 1 DFB x 600 A 20 kA, 30 kA, 10 kA, 24 x 600 A PC 10 horizontal benches A,B,C,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC

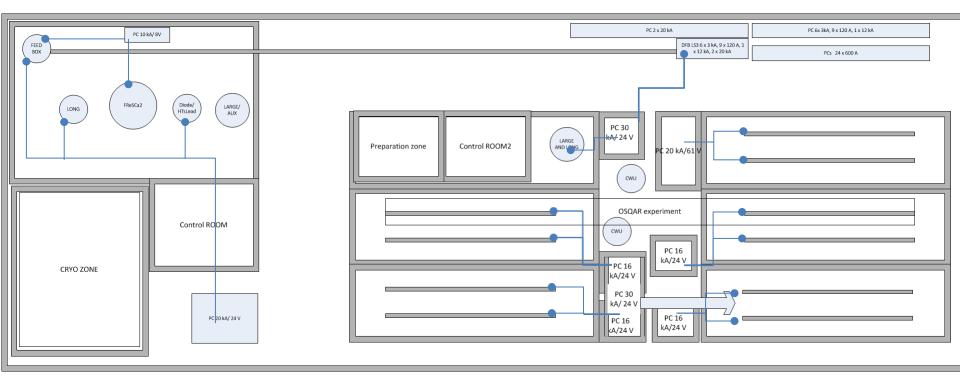


6 kW cryo plant????

What to test? CLo: Cla: CD/CCL: Diodes SFB: Sc link HB: LHC spares

5 vertical cryostats: LONG, DIODE, LARGE/LARGE and LONG, FReSca2 1 Feed box x 20 kA, 1 DFB x 600 A, 1 DFB x LS3 Type 20 kA, 30 kA, 10 kA, 24 x 600 A PC, 20 kA not confirmed!

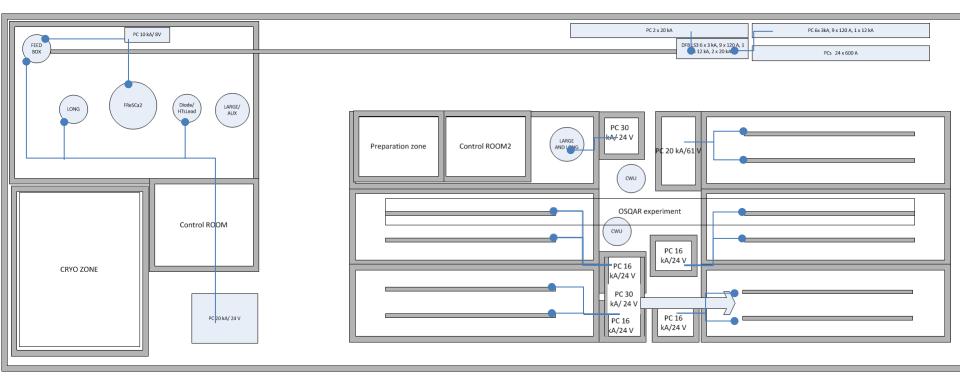
10 horizontal benches A,B,C,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC 1 x 30 kA/24 V



6 kW cryo plant????

What to test? CLo: Cla: CD/CCL: Diodes SFB: Sc link HB: LHC spares

5 vertical cryostats: LONG, DIODE, LARGE/LARGE and LONG, FReSca2 1 Feed box x 20 kA, 1 DFB x 600 A, 1 DFB x LS3 Type 20 kA, 30 kA, 10 kA, 24 x 600 A PC, 20 kA not confirmed!! 10 horizontal benches A,B,C,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC 1 x 30 kA/24 V



6 kW cryo plant????

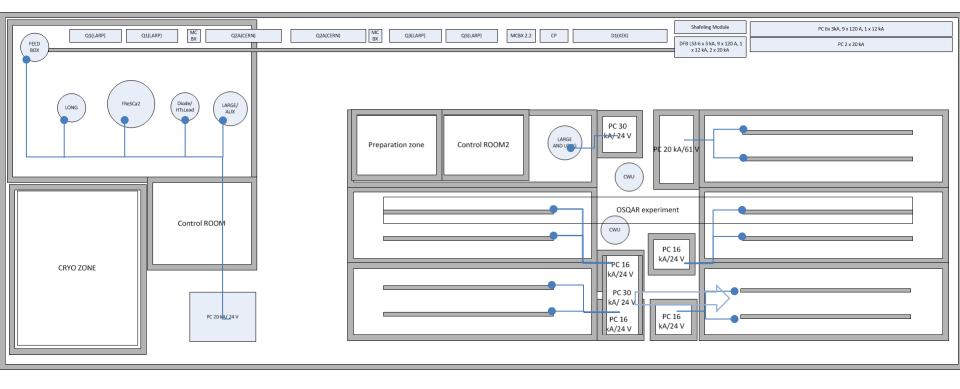
5 vertical cryostats: LONG, DIODE, LARGE/LARGE and LONG, FReSca2

1 Feed box x 20 kA, 30 kA

STRING HL-LHC: 1 DFB x LS3 Type 6 x 3kA, 9 x 120 A, 1 x 12 kA, 2 x 20 kA and shuffling module

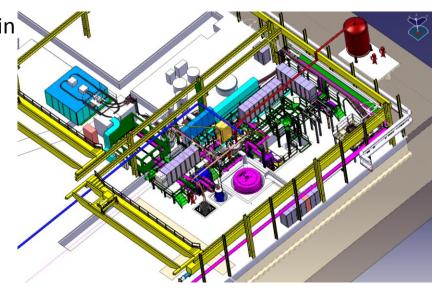
What to test? CLo: Cla: CD/CCL: Diodes SFB: Sc link HB: LHC spares STRING:

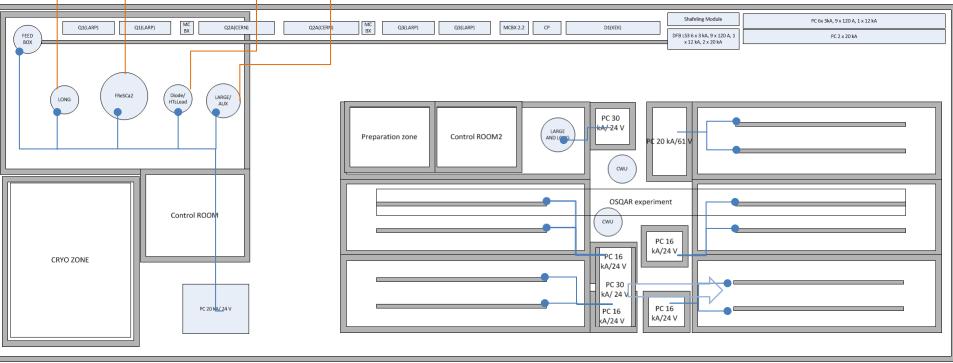
10 horizontal benches A,B,C,E,F 1 x 20 kA/ 61 V PC 4 x 16 kA/ 24 V PC 1 x 30 kA/24 V



SM18 Superconducting Magnet Test Facility as in **2018 Cryostat characteristics**

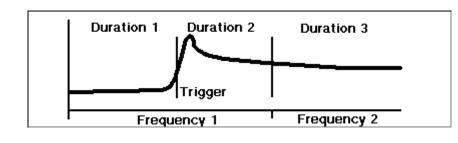
	LONG	HFM	Diode &HTs Lead	LARGE
Useful length (mm)	3800	2500	1600	1400
Useful diameter (mm)	600	1500	500	800
Main Volume (l)	7300/8100	4400+3200	1100	4500/5030
Working temp (K)	1.9 - 4.2	1.9 - 4.2	4.2 - 50	1.9 - 4.2
Max weight (t)	6	27-30	1.5	3
Nr of current leads	2 x 13 kA +	2 x 15 kA		2x 18 kA or
(conventional)	1 x 6 kA	2 x 20 kA	2 x 15 kA	4x 200 A +
				4 x 1200 A





QUENCH DETECTION

The quench detection is planned to be made by using the existing POTAIM cards, configured for every particular test, with a threshold adjusted from case to case between 10 to 100 mV and with a verification time of about 10 ms or less.



HARDWARE FOR QUENCH DATA ACQUISITION SYSTEM

- Type of cards: NI Multifunction DAQ
- Type of system: PXI, with Dual core CPU for redundancy feature (HF/MF should work independently of LF, and vice versa)

FCM SC-LINK

Long

Cryostat

- Nr of +/-10V analog input channels for High Frequency signals (HF: up to 200 kHz / 16 bit resolution / 1mV precision): min 160
- Nr. of +/-10V analog input channels for Medium Frequency signals (MF: up to 5kHz) re-sampled, down from HF recording: min 160 identical to HF
- Nr of +/-10V analog input channels for Low Frequency signals (LF: up to 1 kHz / 16 bit resolution / 1mV precision): 144 differential (the option of single-ended channels has been abandonned)
- Timing synchronisation card: GMT time
- Input filtering to reduce noise if necessary (will be developped by TE/MSC-TF section)

