DEMO2 cold powering test

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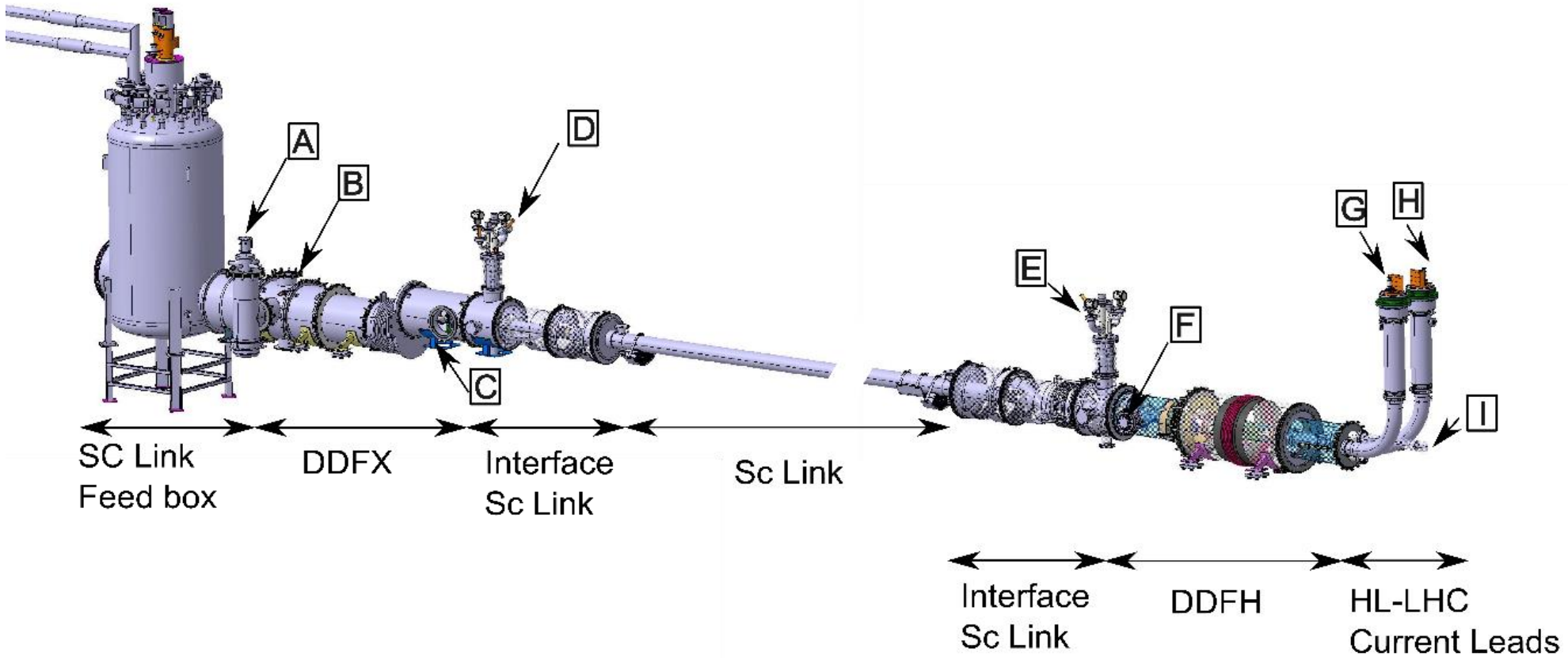
Cold powering test of DEMO2

- Demo 2 is the second step of validation of the Cold Powering System for the HL-LHC magnets
- The main purpose of Demo 2 is to validate the industrial cabling of the full size MgB_2 cable assembly designed for the powering of the HL-LHC Triplets
- Qualification will be performed - in SM 18 - in the existing Superconducting (Sc) Link Demo1 test station, **as from December 2019**
- Adaptations to the existing test station are required mainly to host, at the two terminations, the electrical splices between cables. All the other equipment are unchanged.

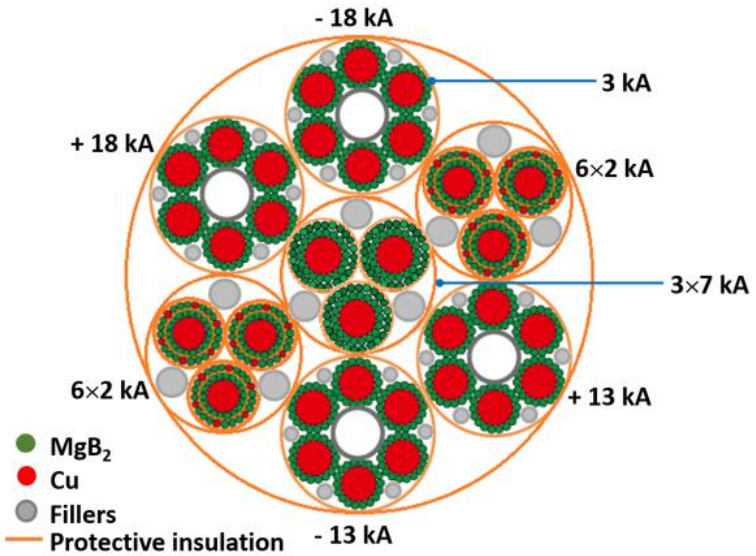
DEMO2 layout



DDFX and DDFH modified(vs. DEMO1) to host the splices

Sc cable of DEMO2

- The cold powering test of DEMO2 consists of powering **multiple circuits** at the same time for verifying potential cross-talk among cables and performances of cable:
  - **1st cold test:** Measuring **one 18 kA circuit** and **a pair of 7 kA cables** (powered from DDFH)
  - **2nd cold test** Measuring the other **pair of 18 kA cable** (powered from CFB) and the **six coaxial 2 kA cables connected in serial** and powered from DDFH
- **The 18 kA leads of DEMO1 and their HTS cable will be re used for DEMO2**



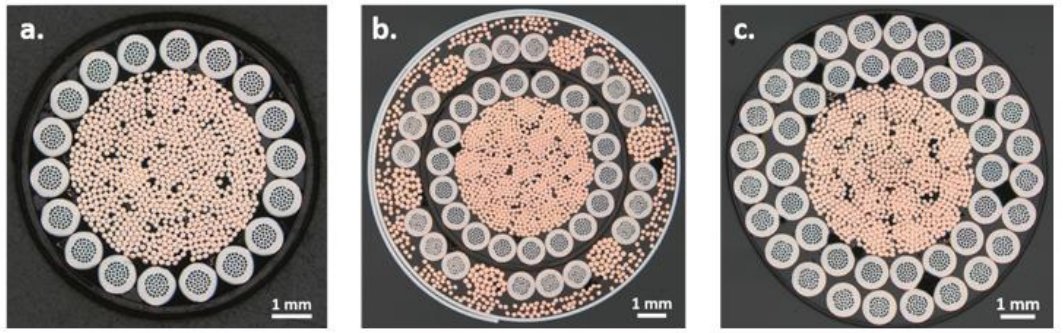
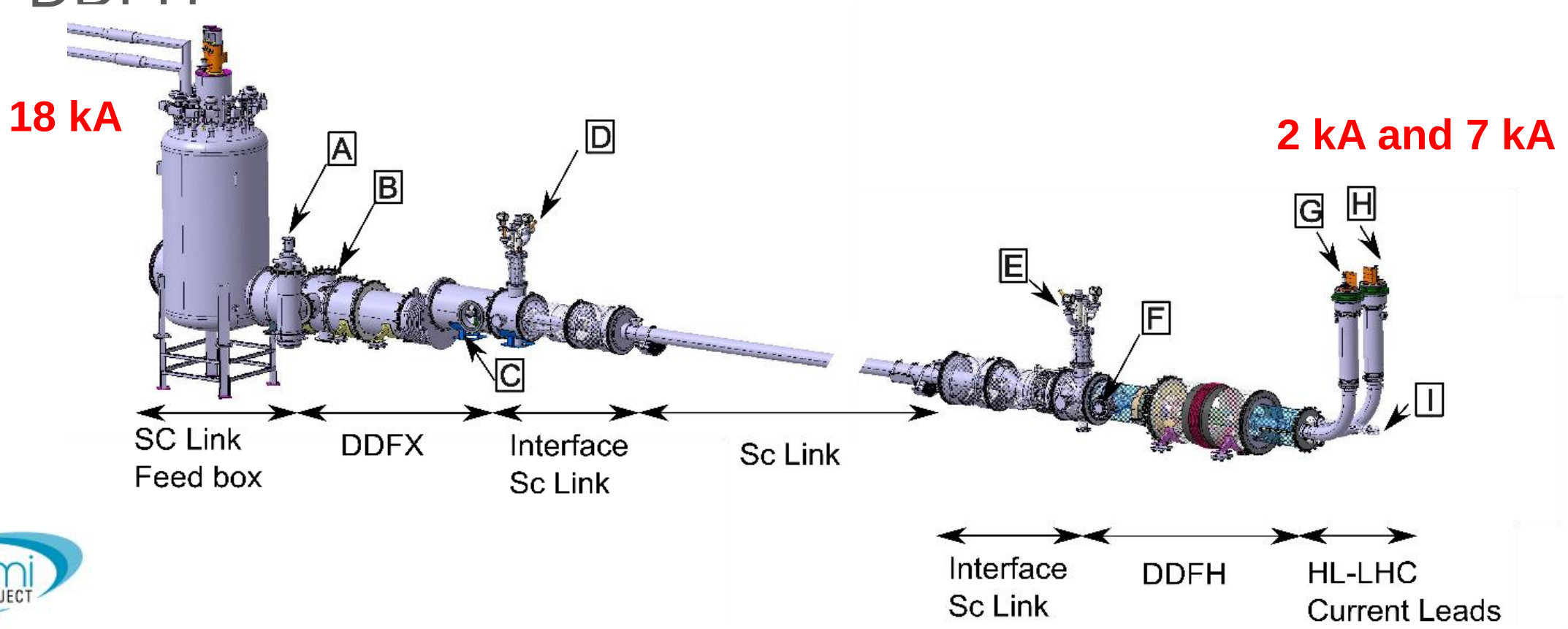


Fig. 2. Cross sections of the three MgB_2 sub-cable units. a) 3 kA cable, b) 2 x 2 kA cable and c) 7 kA cable.

Powering interfaces

- High current circuits (18 kA) powered from HFM CFB
- Low current circuits (2 kA and 7 kA) powered from DDFH



Contribution to the DEMO2 tests

- TE-MSC-TF Cold powering testing
- TE-MSC-CMI Design, procurement assembly of DDFX
- TE-CRG Cryo system
- TE-MPE QPS for cold powering tests
- EN-MME-EDM design of DDFH and DDFX

Planning of 1st CP tests

- With present delay of DDFX delivery, cold powering test starting mid January
- Original testing date mid-October

Planning with existing delay for DDFX assembly		October					November				December				January					
		30-Sep W40	07-Oct W41	14-Oct W42	21-Oct W43	28-Oct W44	04-Nov W45	11-Nov W46	18-Nov W47	25-Nov W48	02-Dec W49	09-Dec W50	16-Dec W51	23-Dec W52	30-Dec W1	06-Jan W2	13-Jan W3	20-Jan W4	27-Jan W5	
Deliveries pre-assemblies and components	DDFX parts delivery												CRYOGENIC STOP	X-mas break	X-mas break	CRYOGENIC STOP				
	DDFX Assembly in SM18																			
	DDFH parts delivery																			
	DDFH Assembly in SM18																			
	Winch system installation																			
	Delivery of MgB2 cable																			
1ST Cold powering test	Pulling the MgB2 cable in the Cryostat																			
	Splicing, interconnections to CL and																			
	Installation of DAQ system (dates TBC by																			
	Installation of warm DC cables (dates TBC by SM18)																			
	Closing of cold mass, pressure and leak test																			
	Cool Down and powering tests																			
	Warm up																			
	Opening of cold mass																			

Planning of 1st CP tests

- With reduced delay of DDFX delivery (1w), cold powering test starting could start in December
- Original testing date mid-October

Planning with reduced delay for DDFX assembly		October					November				December				January				
		30-Sep W40	07-Oct W41	14-Oct W42	21-Oct W43	28-Oct W44	04-Nov W45	11-Nov W46	18-Nov W47	25-Nov W48	02-Dec W49	09-Dec W50	16-Dec W51	23-Dec W52	30-Dec W1	06-Jan W2	13-Jan W3	20-Jan W4	27-Jan W5
Deliveries pre-assemblies and components	DDFX parts delivery												CRYOGENIC STOP	X-mas break	X-mas break	CRYOGENIC STOP			
	DDFX Assembly in SM18																		
	DDFH parts delivery																		
	DDFH Assembly in SM18																		
	Winch system installation																		
	Delivery of MgB2 cable																		
1ST Cold powering test	Pulling the MgB2 cable in the Cryostat																		
	Splicing, interconnections to CL and instrumentation																		
	Installation of DAQ system (dates TBC by SM18)																		
	Installation of warm DC cables (dates TBC by SM18)																		
	Closing of cold mass, pressure and leak test																		
	Cool Down and powering tests																		
	Warm up																		
	Opening of cold mass																		

Planning of 2nd CP tests

- 2nd Cold powering test starting end of Feb 2020

Planning with existing delay for DDFX assembly		January					February				March				Apri		
		30-Dec W1	06-Jan W2	13-Jan W3	20-Jan W4	27-Jan W5	03-Feb W6	10-Feb W7	17-Feb W8	24-Feb W9	02-Mar W10	09-Mar W11	16-Mar W12	23-Mar W13	30-Mar W14	06-Apr W15	13-A W1
Deliveries pre-assemblies and components	DDFX parts delivery	X-mas break	CRYOGENIC STOP														
	DDFX Assembly in SM18																
	DDFH parts delivery																
	DDFH Assembly in SM18																
	Winch system installation																
	Delivery of MgB2 cable																
1ST Cold powering test	Pulling the MgB2 cable in the Cryostat																
	Splicing, interconnections to CL and																
	Installation of DAQ system (dates TBC by																
	Installation of warm DC cables (dates TBC by SM18)																
	Closing of cold mass, pressure and leak test																
	Cool Down and powering tests																
	Warm up																
	Opening of cold mass																
2nd Cold powering test	Splices Connections																
	Closing of cold mass, pressure and leak test																
	Cool Down and powering tests																
	Warm up																
	Second and third cool down																
	Powering tests after three cool down																