



Cryomodule Assembly: Update

M. Garlaschè on behalf of MME



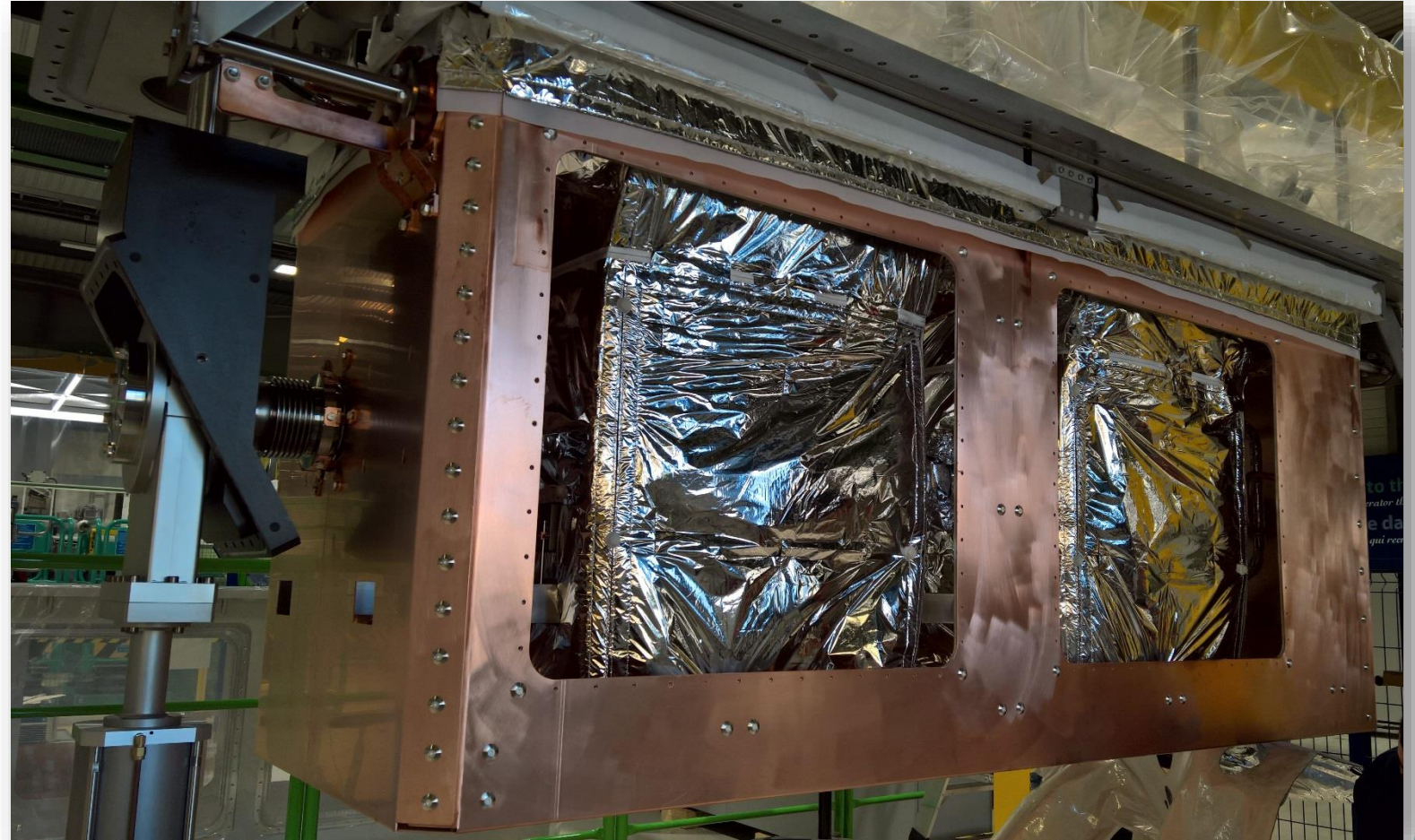
16/10/2017 – CCTC Meeting

Finished Activities

STEP up to 11 finished

THIS WEEK:

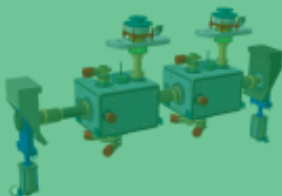
- Today: Temp Sensors on Thermal shield [Cryo]
- 50K MLI [MME]
- Coax Assy + Meas [RF + MME]
- Low Cryostat on Rail



Step 1



- 1 Remove clean room equipments
- 2 Mounting equipment protections
- 3 Remove FPC plate protection
- 4 Add support LHCACF_T0409
- 5 Remove support LHCACF_T0347
- 6 Insertion of FPC heaters
- 7 Set the FPC plate as high as possible
- 8 Remove the lateral supports



Step 2

- 1 Weld the cryo extensions and stoppers (DN100 x2 + HDM UP x4 + HOMS Up stopper x4 + He tank x2)
 - 2 Intermediate leak test
 - 3 Positioning and welding of upper cryoline
 - 4 Intermediate leak test
 - 5 Insertion of tuning frame upper part
 - 6 Assembly and positioning of tuning frame
 - 7 Weld hom cooling line (HDM UP x2)
 - 8 Leak test
- See assembly drawing LHCACF_A0008



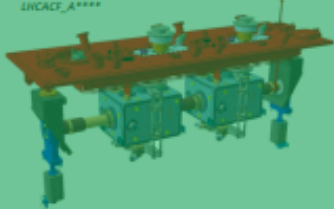
Step 3

- 1 Installation of tuner BELLOWS (WITH SUPPORT TOOLING)
 - 2 Magnetic shield on FPC plates (x2)
 - 3 Installation of Tuner double pipe on tuning frame
 - 4 Adjust the FPC oblong plate to the nominal height
 - 5 Connect the tuner double pipe to the tuner bellows
 - 6 Cryo Instrum. -> FPC Thermal sensors x5
 - 7 Installation partial supports -> for cavity blades and valve supports
- See assembly drawing LHCACF_A0008



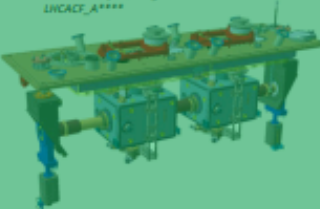
Step 4

- 1 Low the cryostat top plate to the nominal position
 - 2 Connect FPC oblong plate to top plate
 - 3 Intermediate leak test of oblong plate
 - 4 Connect support blades x4
 - 5 Connect valve box to top plate x2
 - 6 Connect cryolines to top plates with tirants
 - 7 Installation of FPC thermal MLI + screen + Braids
 - 8 Attach FPC thermal screen to cryostat thermal screen
 - 9 Cryo Instrum. -> Cernox on helium tank + HDM + Pick Up
 - 10 Meca Instrum. -> Stress gauges on FPC pipes and blades
- See assembly drawing LHCACF_A****



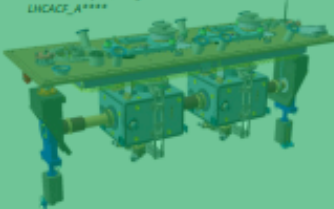
Step 5

- 1 Assembly of the cavity support system
- See assembly drawing LHCACF_A****



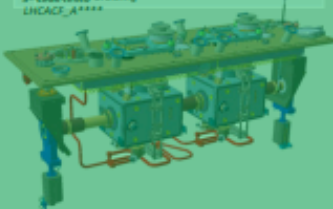
S.6

- 1 Load transfer from trolley to Cryostat top plate
 - 2 Alignment check
 - 3 Remove clean room trolley
- See assembly drawing LHCACF_A****



Step 7

- 1 Welding of extension for pressure measurement
 - 2 Installation of level gauges (x2) + wires
 - 3 Welding of lower cryoline
- See assembly drawing LHCACF_A****



Sub assembly details

Oblong plate support

LHCACF_T0409



Upper cryoline

LHCACFQ0349



Tuner bellows + double pipe

LHCACFTU0053 – Tuner bellows
LHCACFTU0057 – Rod Flange
LHCACFTU0066 – Tuner double pipe
LHCACFTS0019&28 – Braids for tuner



Cryostat upper plate

LHCACF_A0007 – Overall top plate assy



Assembly files upper plate

See EDMS N° XXXXXX

Cavity support

LHCACFAH0030 – Support assembly



STEP 5 - Assembly files

See EDMS N° XXXXXX

STEP 6 - Assembly files

See EDMS N° XXXXXX

Cryo Extension line

LHCACFQC0357 – Bellows for cryo measurement



Protections HOMS & Pick Up

LHCACF_T0643 – HDM feedthrough protection
LHCACF_T0694 – Pick up feedthrough protection



Cryo extensions

LHCACFQC0054 – HDM weld jaw
LHCACFQC0091 – HDM stopper
LHCACFQC0053 – DN100 weld jaw



Magnetic shield

LHCACFWM0011 – FPC half plate 1/2
LHCACFWM0018 – FPC half plate 2/2
LHCACFWM0020 – Special washers



Thermalisation braids

LHCACFTS0018 – Braids for FPC & blades



Thermal screen + MLI



STEP 1 - Assembly files



Tuning frame

LHCACFTU0054 – Tuning frame assembly



Partial support



STEP 8 - Assembly files
See IDMS/N/XXXXX

Cryo instrumentation
UNCACFAM008

BCAM equipment
UNCACFAM000 - BCAM assembly
FSI Target and support

STEP 9 - Assembly files
See IDMS/N/XXXXX

STEP 10 - Assembly files
See IDMS/N/XXXXX

MU 2K
UNCACFLE000

Thermal screen
UNCACFLE020 - Thermal screen bottom assembly
UNCACFLE022 - Thermal screen external assembly
Thermal screen preparation

STEP 11 - Assembly files
See IDMS/N/XXXXX

STEP 12 - Assembly files
See IDMS/N/XXXXX

Thermal screen lateral panels & braids

1. Installation of thermal screen lateral panels & braids
2. Installation of thermalization braids on cold/warm transition chambers
3. Installation of thermalization braids on upper cryostat supports
4. Installation of MLI SOK
5. Installation of magnetic shield small panels (on the side above CMT)

See assembly drawing UNCACF_01111

Thermal screen (bottom)

1. Install the gasket in the cryostat lower assembly
2. Install the gasket on the value line (2)
3. Insertion in the cryostat
4. Load instrument from Portique to cryostat
5. Screw the top assembly to the lower cryostat
6. Adjust and screw the value line to the lower cryostat
7. Remove the temporary value line support and close the opening with a TIGI flange
8. Finalize the installation of the lower RF lines (2) - protection on ceramic
9. Connect the RF lines to thermalization braids

See assembly drawing UNCACF_01111

Jumper

1. Move the cryostat outside the portique area
2. Jumper assembly sequence

See assembly drawing UNCACF_01111

Doors

1. Assembly of tuner location
2. Alignment Check
3. Thermal shield and MLI closure
4. Vacuum tank closure

See assembly drawing UNCACF_01111

Cryo measurement line

UNCACFQ0000 - Pressure measurement set up

03 Preparation of cryogenic measurement set-up
Welding of pipes
Assembly with pressure transmitter and flanges

MU SOK

UNCACFLE000

Magnetic shield panels

UNCACFW0000 - Magnetic shield lateral panel

STEP 12 - Assembly files
See IDMS/N/XXXXX

Thermal screen (bottom)

UNCACF_0000 - Cryomodule lower assembly

Lower vessel preparation
See IDMS/N/XXXXX

RF lines

UNCACFLE020 - Pick up coaxial line
UNCACFLE024 - Lower NCM Coaxial line
UNCACFLE026 - Upper NCM Coaxial line

STEP 13 - Assembly files
See IDMS/N/XXXXX

FSI flanges

UNCACFAM003 - FSI device on flange

STEP 14 - Assembly files
See IDMS/N/XXXXX

Tuner actuation

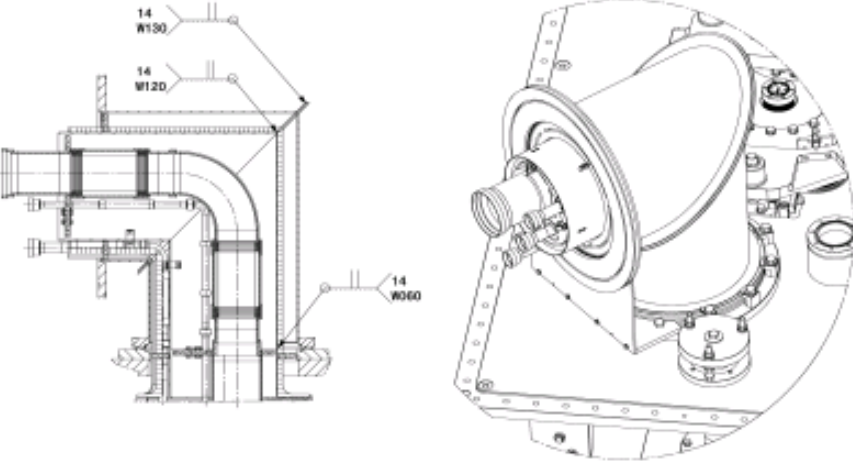
UNCACFLE011 - work on going

STEP 15 - Assembly files
See IDMS/N/XXXXX

Jumper connection welds by MME

Last steps of Cryostating:

- weld of lines
- Local leak check
- Global Insulation Vacuum Leak check + Cryo Line Pressure test (1.8 bar – discussions with HSE ongoing. Watch out, no pressure relief valve)



Inside M7:

- Hp: service box completely welded and checked
- MME to weld griffe flanges
- Local weld leak check
- Final pressure test (1.8 bar)

