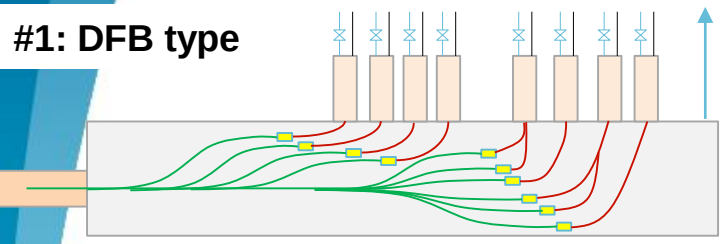
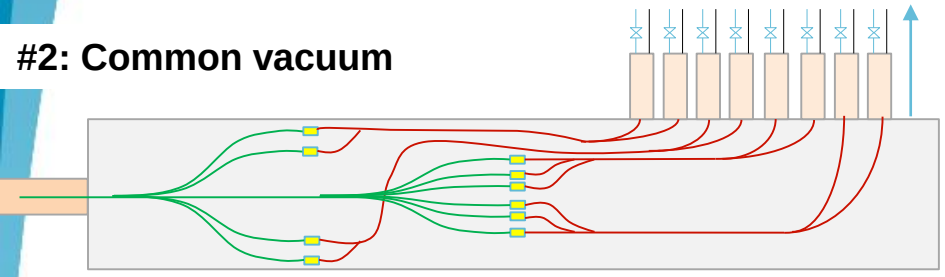
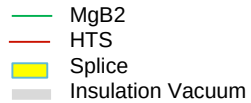
DFHx: 1 Unit Vs 2 Units

#1: DFB type

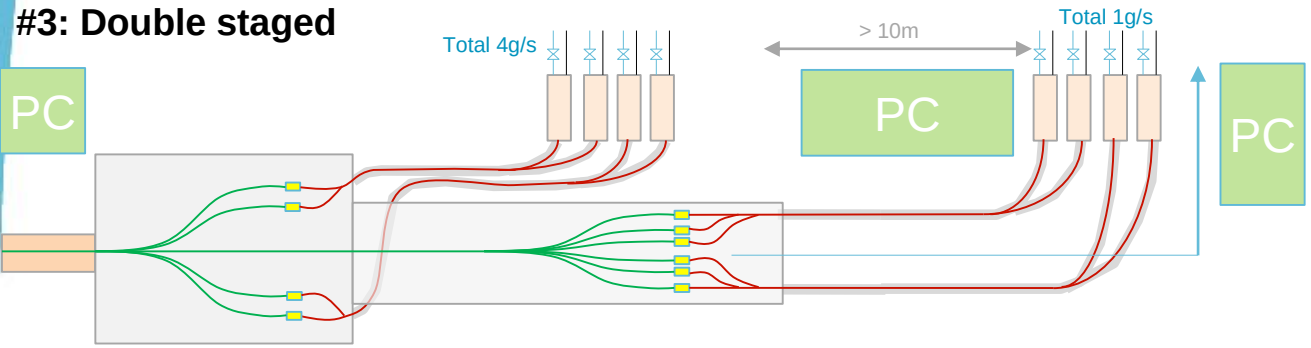


#2: Common vacuum

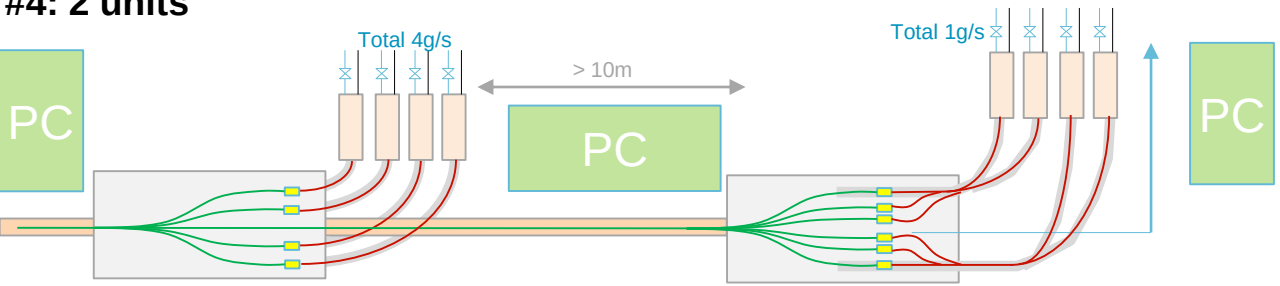




#3: Double staged



#4: 2 units



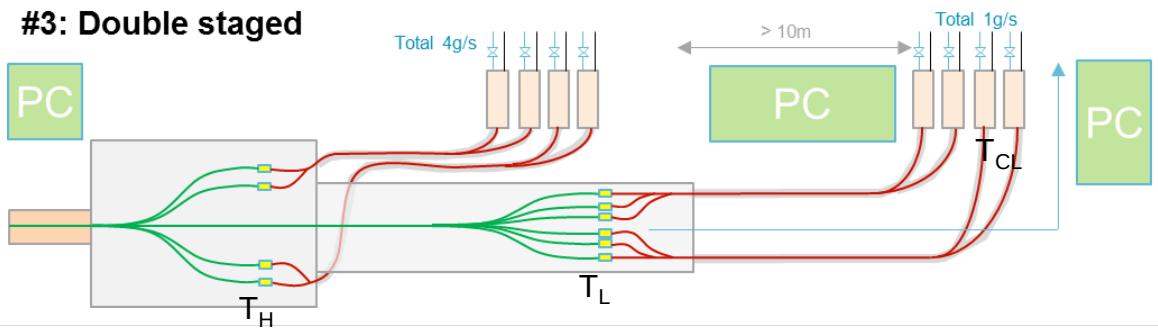
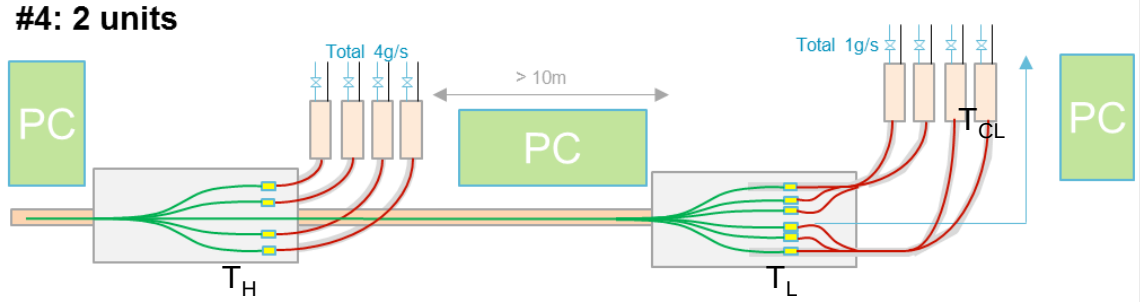
- Boundary conditions:
  1. HTS length: From 3m on
  2. MgB2 < 20K / HTS < 50 K
  3. Disconnector box close to current leads
  4. PC 18kA close to 18kA CL
  5. Mass flow top CL : 0.05 g/s/kA

Critical Undesirable Favorable Need external input	~~#1: DFB type~~	~~#2: Common vacuum~~	#3: Double staged	4# 2 Units
Compliancy with interfaces/integration	Not possible to install disconnector boxes	Not possible to install disconnector boxes	Interface WP6b OK	Interface WP6b OK
Efficiency convective splice cooling	Minimised heat loads to GHE flow	Minimised heat load to Ghe flow (splices + 20W static)	Minimised heat load to Ghe flow (splices + 20W static)	Interlink heat load to low mass flow (1g/s - ΔT≈3K) T return line ???
Splice access	Very limited	Granted 360 deg	Granted 360 deg	Granted 360 deg
Dimensions	Long to allow MgB2 staging Rmin=1.5m Top CL > 3m	No need for vacuum jacket on CL. About Ø1.8mx10m Top CL > 3m	Individual vacuum jackets About Ø2m x 8 m	2 x Ø1.5 x 4m + 10m interlink
SCLink transport	MgB2 handled in situ	MgB2 handled in situ	MgB2 handled in situ	Preparation of MgB2 may be feasible
HTS cables length	Minimised	≈10m max	Up to 14m	Minimised < 6m
MgB2 cables length	Medium	Minimised	Medium	Low current + 10m
Manufacturing & logistics	DFB type Many variant HTS	DFB type longer	Cryostat type Limited CL variants	More units but similar boxes All same CL

DFHx: 1 Unit Vs 2 Units

- Boundary conditions:
  1. HTS length: From 3m on
  2. MgB2 < 20K / HTS < 50 K
  3. Disconnector box close to current leads
  4. PC 18kA close to 18kA CL
  5. Mass flow top CL : 0.05 g/s/kA
  6. Rmin MgB2 = 1.5m

MgB2
HTS
Splice
Insulation Vacuum

	#3: Double staged	#4: 2 units
Critical **Undesirable** **Favorable** **Need external input**		
Compliancy with interfaces Integration	Interface WP6b OK	Interface WP6b OK
Efficiency convective splice cooling	Minimised heat load to Ghe flow : T_H=T_L & T_{CL}≈T_L+10K (splices + 20W static) ➔ Max Temperature of return line ?	Low mass flow in interlink ➔ T_L=T_H+ 3K (without thermal shield) ➔ Return line for shielding T_{CL}≈T_L+3K << Tmax HTS Temperature of return line ? Permanent mass flow during operation ?
Splice access	Granted 360 deg	Granted 360 deg
Dimensions	Individual vacuum jackets About Ø2m x 10 m ➔ need installation verification	2 x Ø1.5 x 4m + 10m interlink
Transport / Installation	What is max size ? Local partial handling of MgB2 required	Small components Local partial handling of MgB2 required
SCLink transport	MgB2 handled in situ (Ø1.6m at splice location)	Preparation of MgB2 may be feasible
HTS cables length	Up to 14m	Minimised < 6m
MgB2 cables length	Medium (minimised)	Low current + 10m
Manufacturing & logistics	Cryostat type Limited CL variants	More units but similar boxes All same CL

Questions

- Return line :
  - Max temperature ? Flexibility ?
  - Minimum mass flow ? (for operation/quench configuration?)
- Splice cooling:
  - Are 5g/s & 17K sufficient ?
  - Which margin? Which max resistance to consider for design?
  - ➔ next week topic.