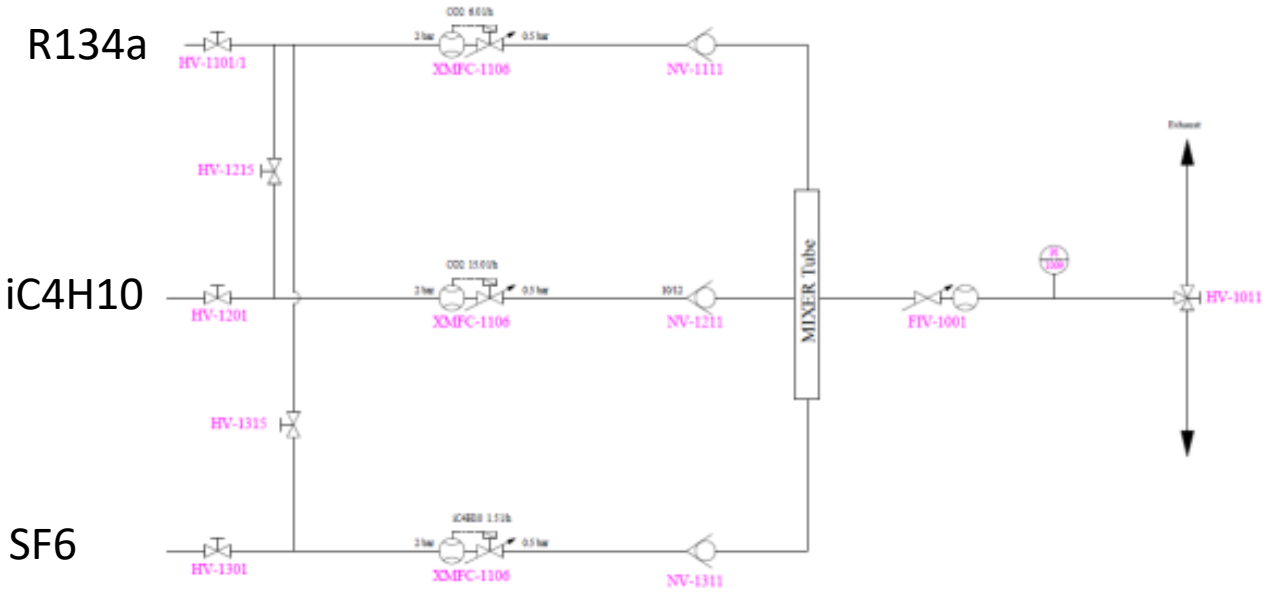
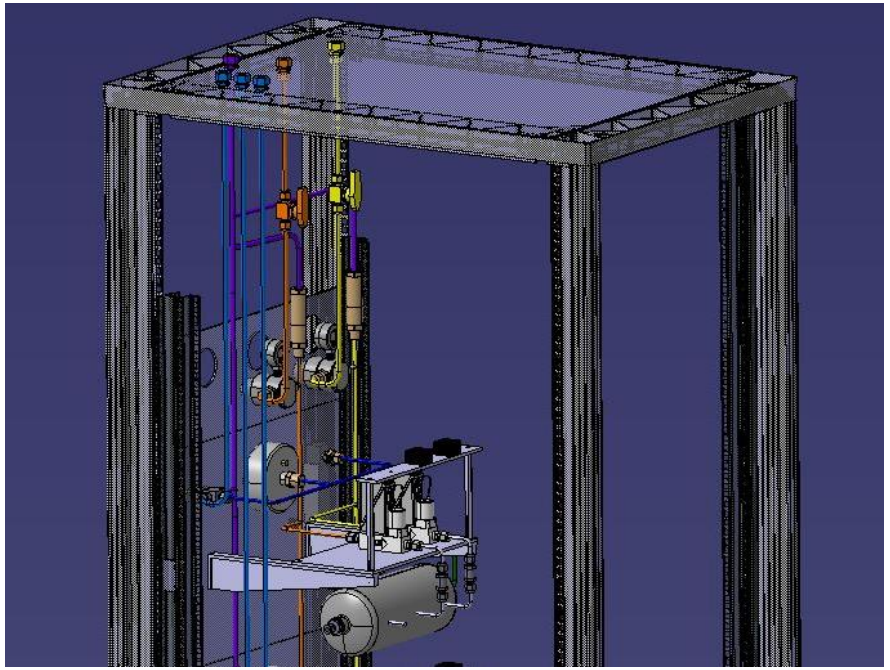
CODEX-b gas system proposal

Mixer

Simple mixer with one set of MFCs only
Controlled with a laptop



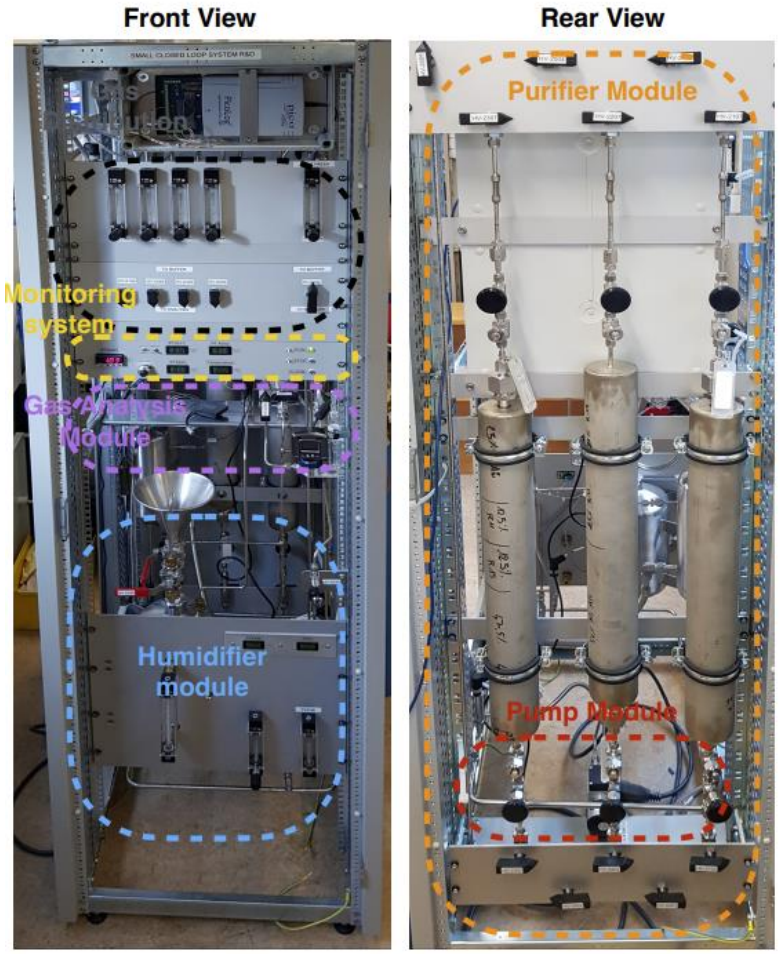


+ CO2 line

Only MFCs are10 kCHF

Gas recirculation system

Mixture from surface will go to underground, where we propose to install the gas recirculation system (as close as possible to the detector to minimize installation work/cost)



- 2013: Development of "A portable gas recirculation unit" JINST 12 T10002

  Characteristics of the system:
  - ~10 detectors
  - ~100-200 l/h
  - One single rack can contain the full system + humidifier
  - Control system based on simple PLC
  - Monitoring system based on Grafana
  - Possible to have some parameters controlled remotely
  - Few sensors
  - Several gas systems already produced and in use
  - Small purifier cartridges, operated manually

  - ~30 kCHF

Humidifier

It will be in the gas recirculation rack

Simple system with one stainless steel volume working as a buffer where the gas is bubbling through

Two rotameters (manual) to split the gas in two lines (dry and through the water)

One analyser to check the mixture dewpoint

Mixture Distribution to detectors

Un panneau avec 5 rotametres DK800 calibration air 1.6 a 16ln/h avec raccords 4200CHF

Un panneau avec 7 rotametres DK800 calibration air 1.6 a 16ln/h avec raccords 5600CHF

Deux panneaux avec 14 rotametres DK800 1.6 a 16ln/h avec raccords 10700CHF

Selected option with 7 rotameters

Gas cost

open mode	**20**	**l/h**
	300	**day/year**
	144	**m3/year**

But goal is to recirculate the mixture as much as the detectors will allow (90%?)

Mix	GWP	tCO2eq/year	Bottle exchange /year	Gas cost/year (kCHF)
RPC standard	1482	952	1.5	7.6
RPC standard+ 30%CO2	1529	814	1.1	5.6
ECO65	369	216	43	35.3

Gas bottles to buy:

Isobutane 24.5 kg	400
SF6 10 kg	750
R134A 405 kg	4300
Total 5.5 kCHF	

Operation

We will help as much as possible, however one person from CODEX-b should be with us to learn.

Standard operation will be responsibility of the experiment

Specific interventions will be followed by Gas Systems team: for example, first start of the system, purifier regenerations

If you agree on construction, cost for material to be paid in advance, manpower after commissioning.
Consider the delivery time of components: for example, for MFCs is about 6 weeks

Conclusions

If you agree on construction, cost for material to be paid in advance, manpower after commissioning.
Consider the delivery time of components: for example, for MFCs is about 6 weeks

Mixer	18600
Tuyauterie SG -UX	1600
Humidifier + Analyseur	8800
Distribution	5600
Systeme de circulation en boucle fermé	6000
Purificateur 3 cartouches + regeneration	3700
Circuit electrique avec logo	5000
Installation	5000
Dossier Technique et certification Atex	2700
Total sans les gaz ni l'ordinateur	57000

My very old cost estimate was
15 k mixer
30 k recirculation system
5 k humidifier
→ 50 k

Where not included:
Distribution 5.6 k
Installation 5 k (I need to check if it includes the Cu pipe)
Dossier technique et certification atex 2.7 k