

Cryogenic Infrastructure Installation

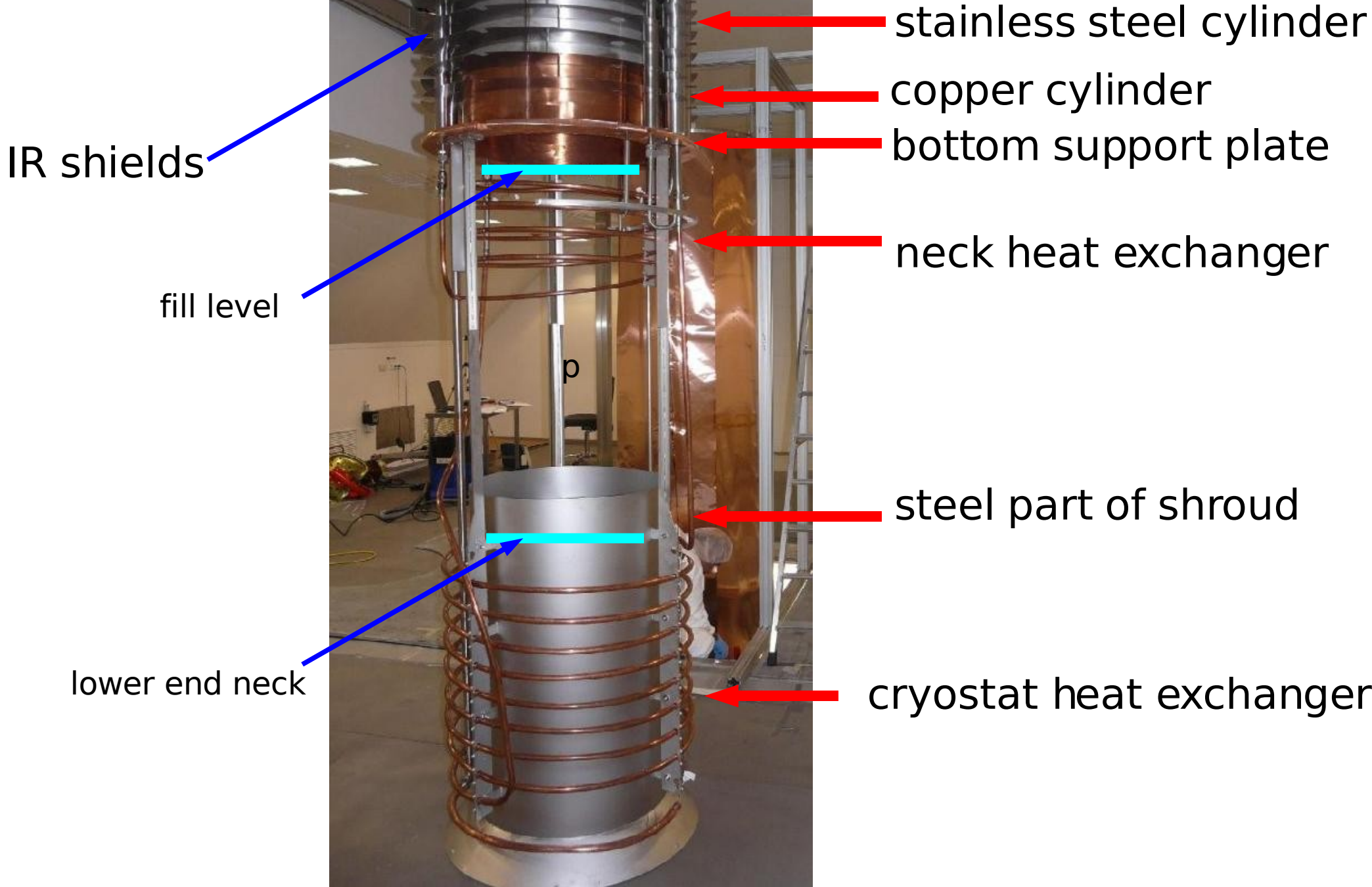
Bernhard Schwingenheuer, MPI Heidelberg

Content:

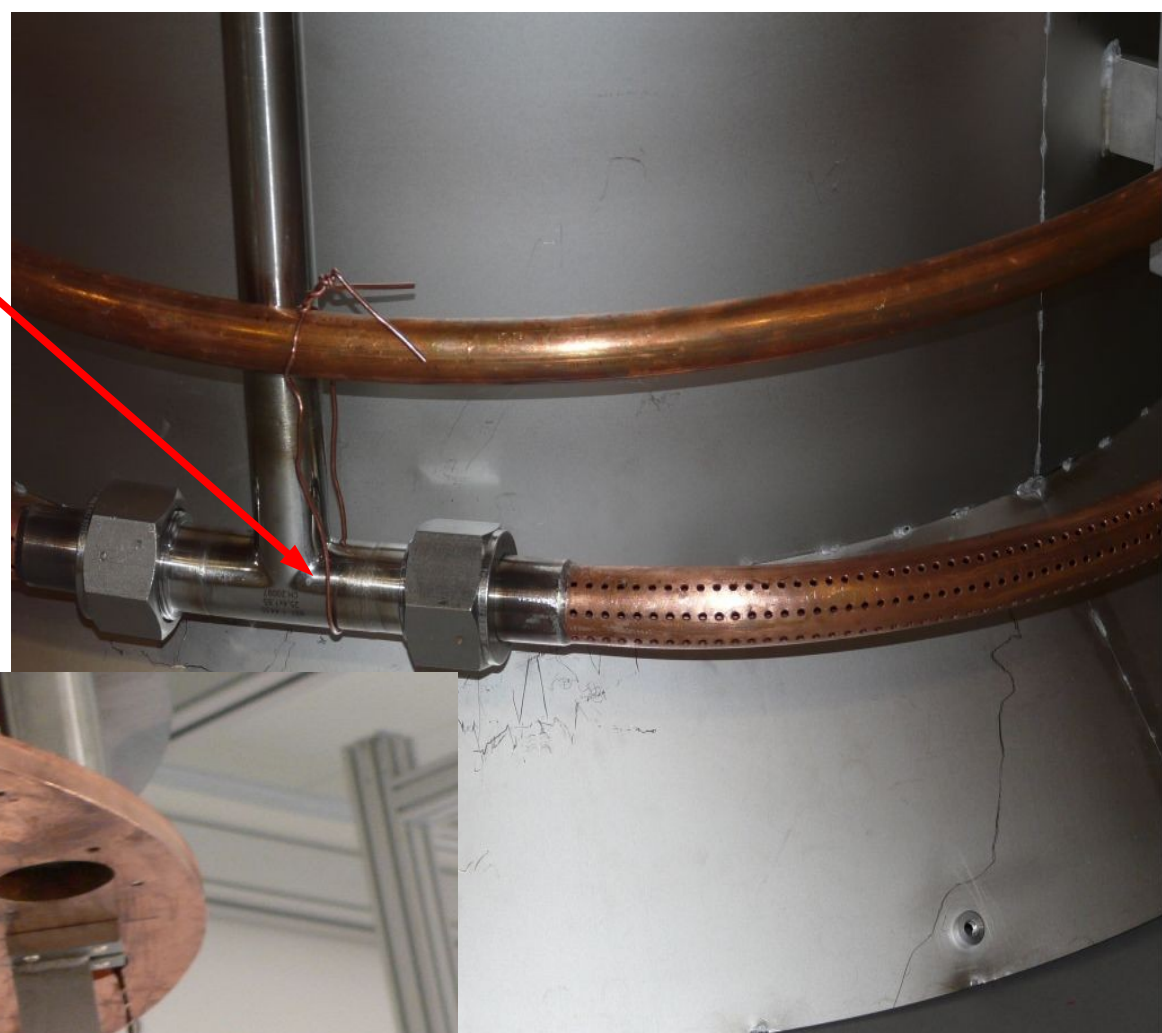
- slide show
- web interface
- commissioning plans

After inspection of cryostat (and wiping) assembly of internal cryostat piping



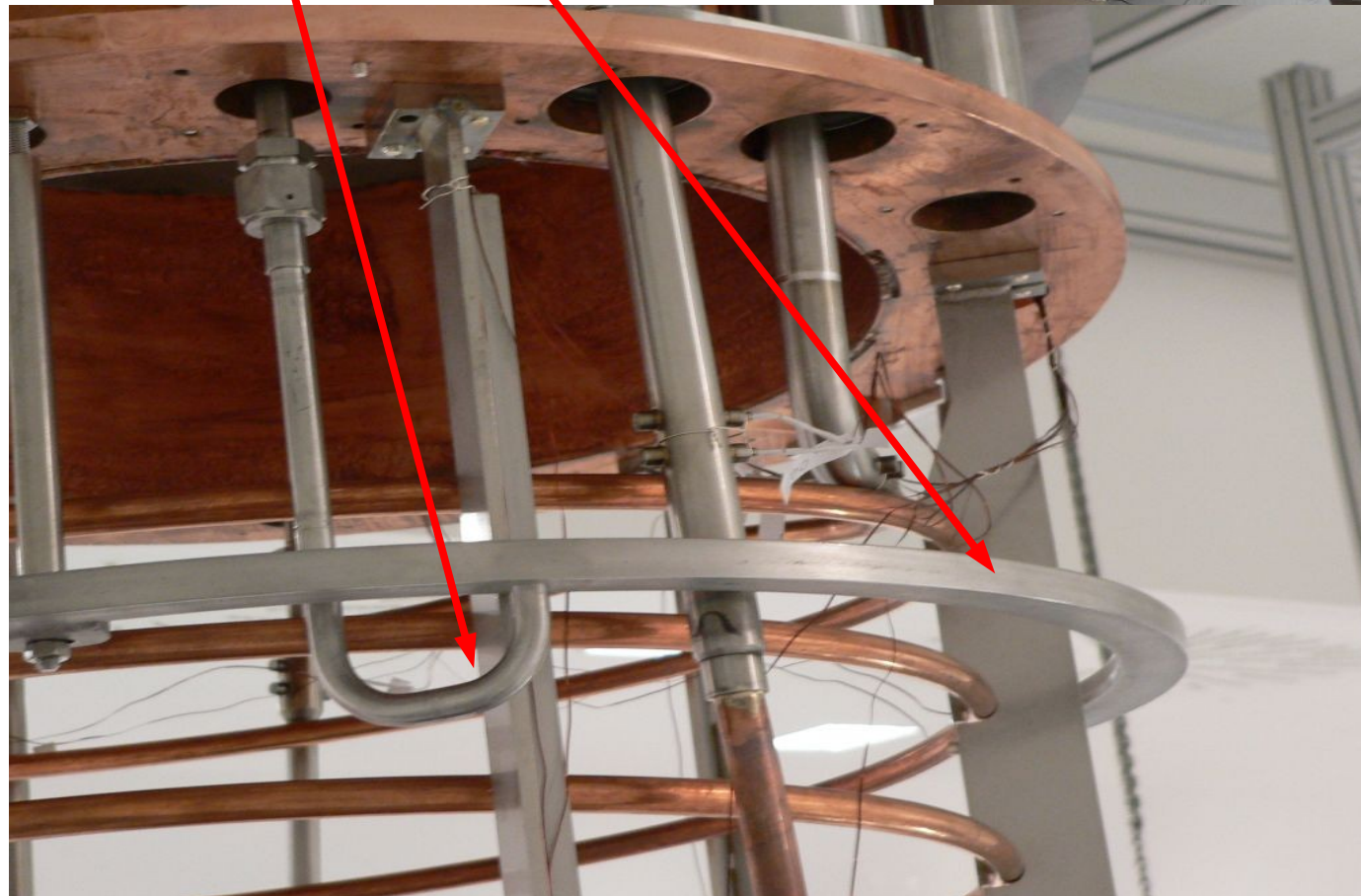


LAr filling tube

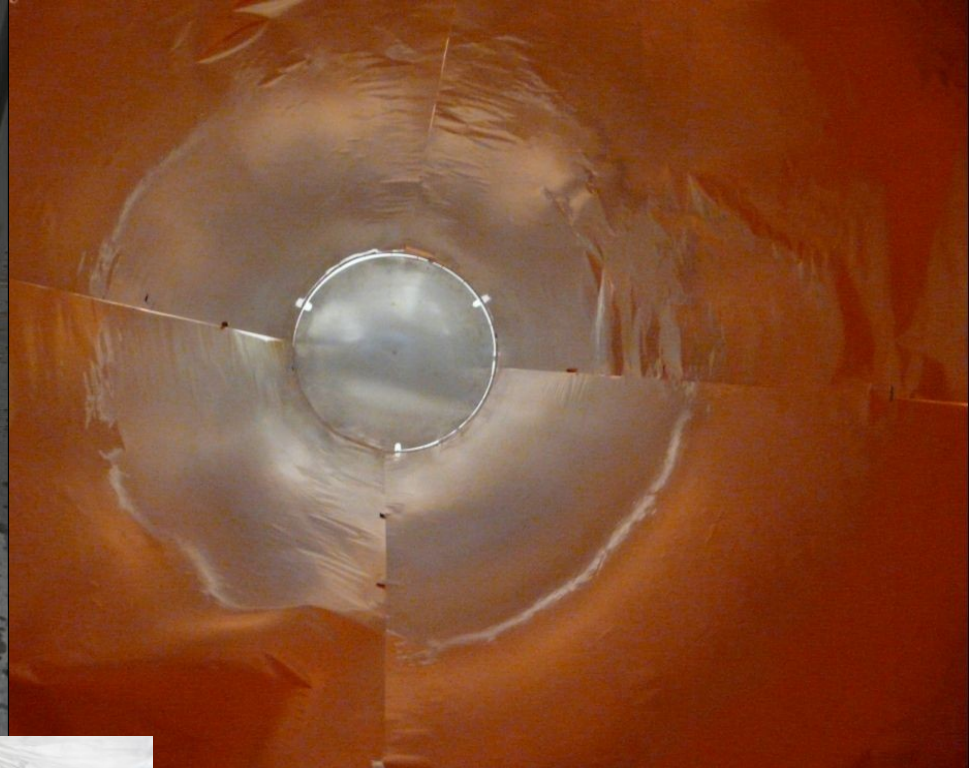
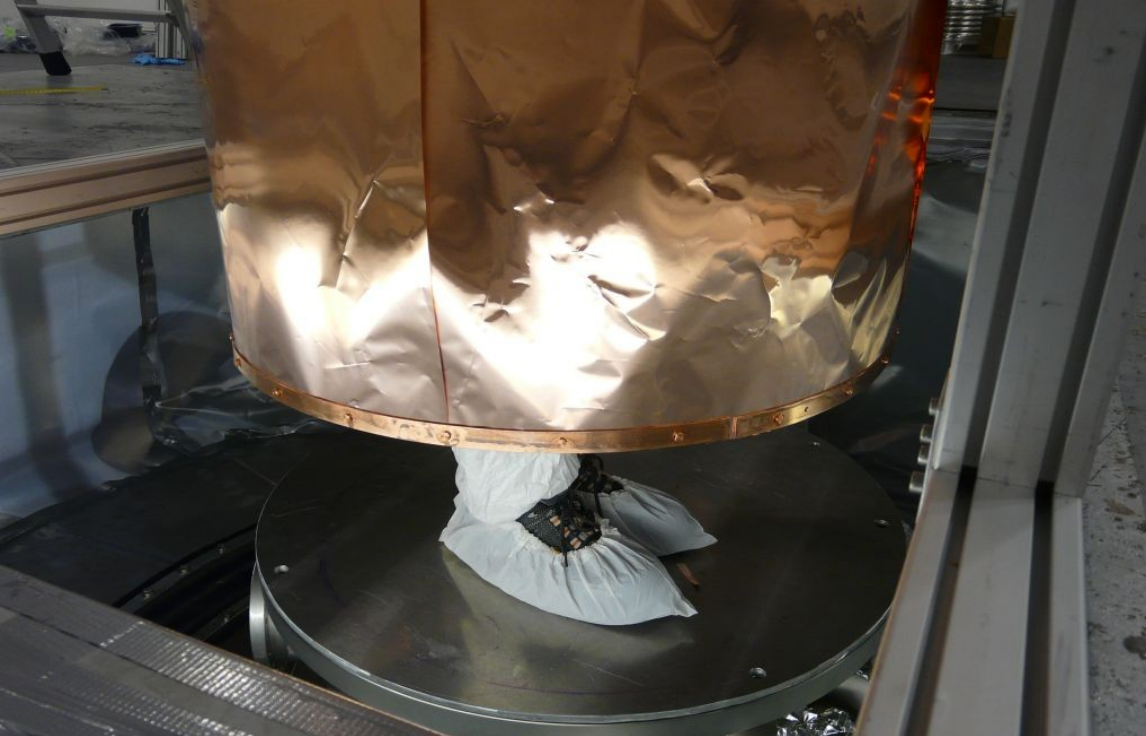


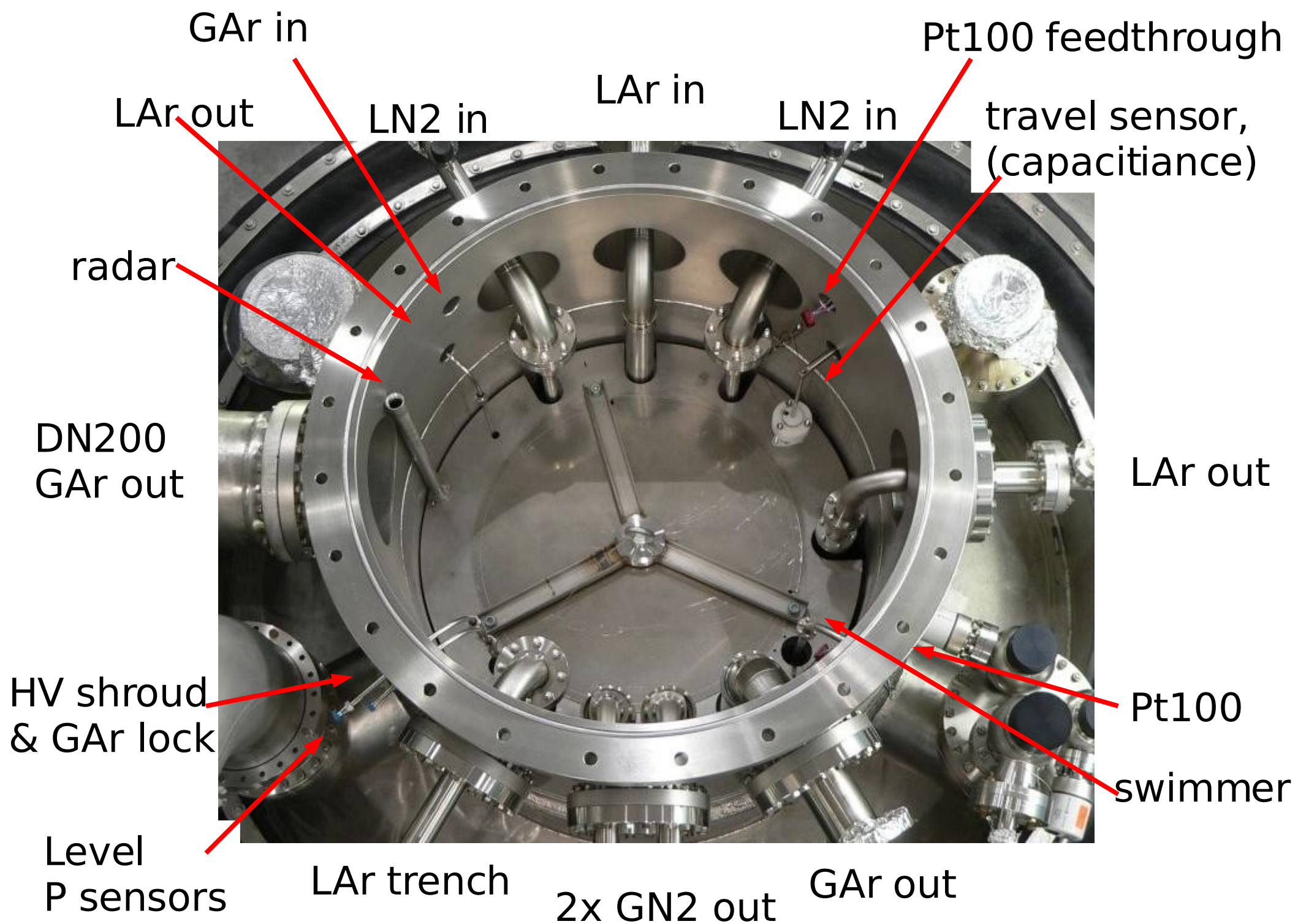
outlet

trench (U-form)





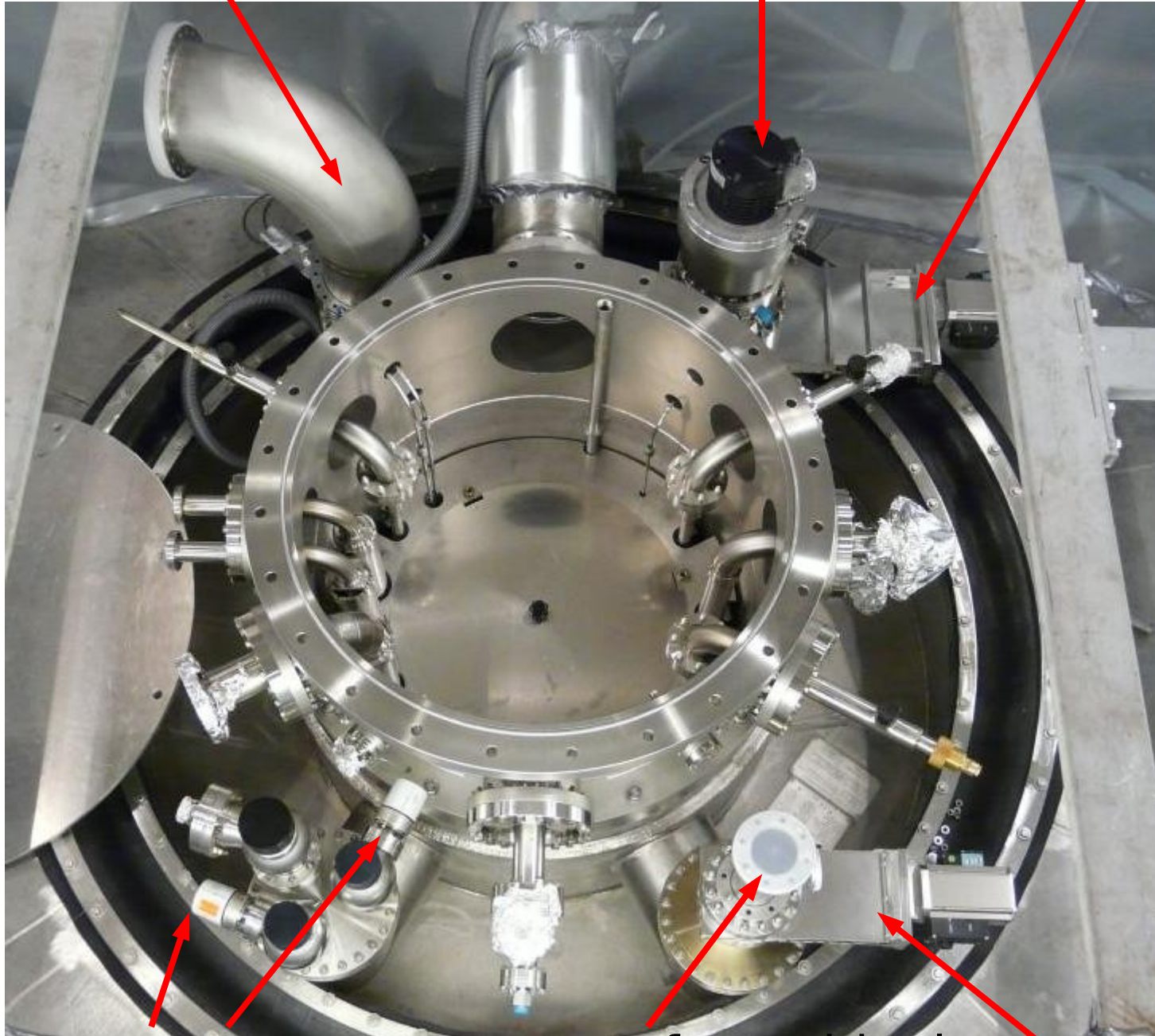




safety disk + exhaust

Turbo pump

shutter

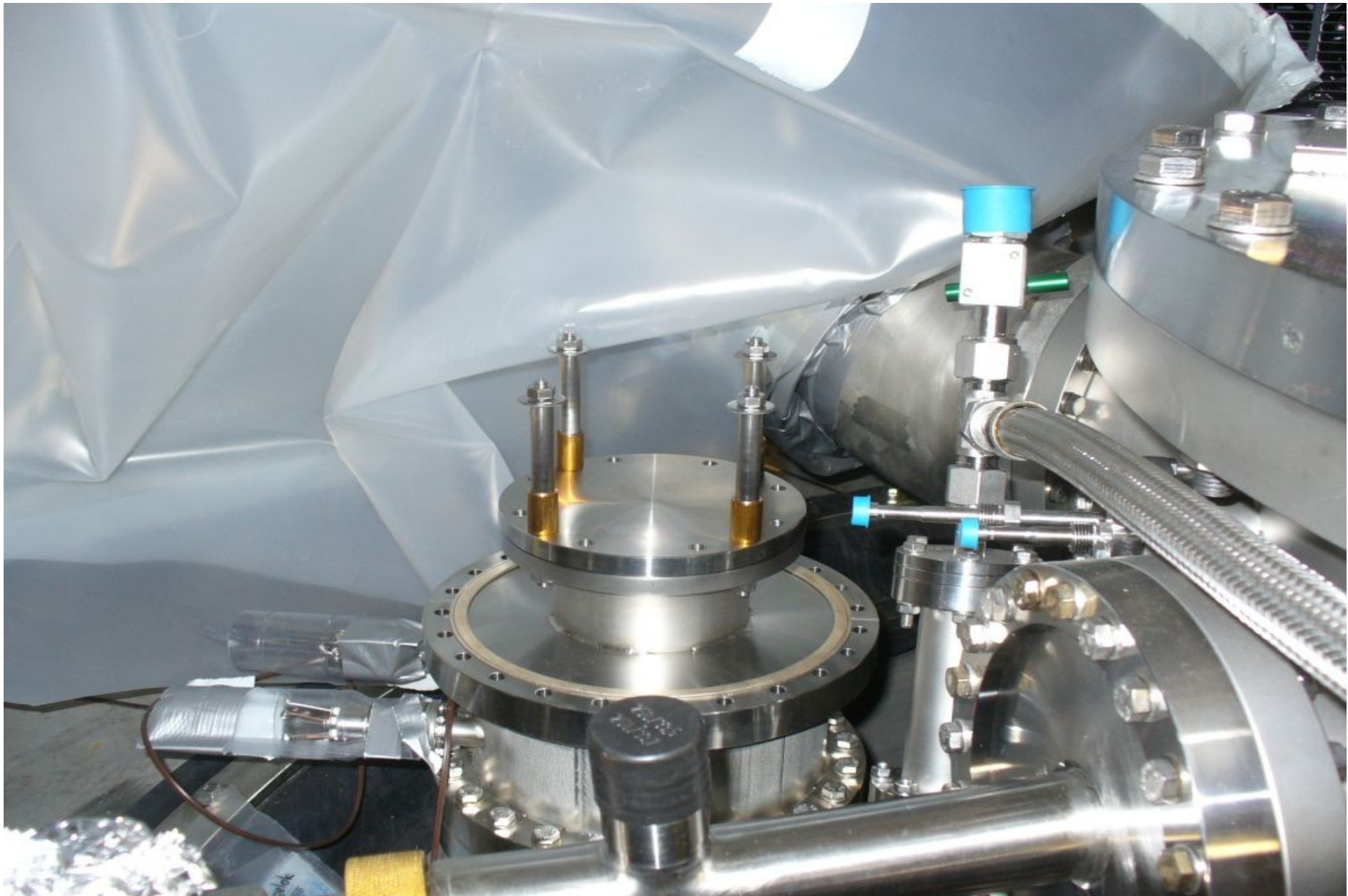


pressure sensors

port for residual gas analyzer

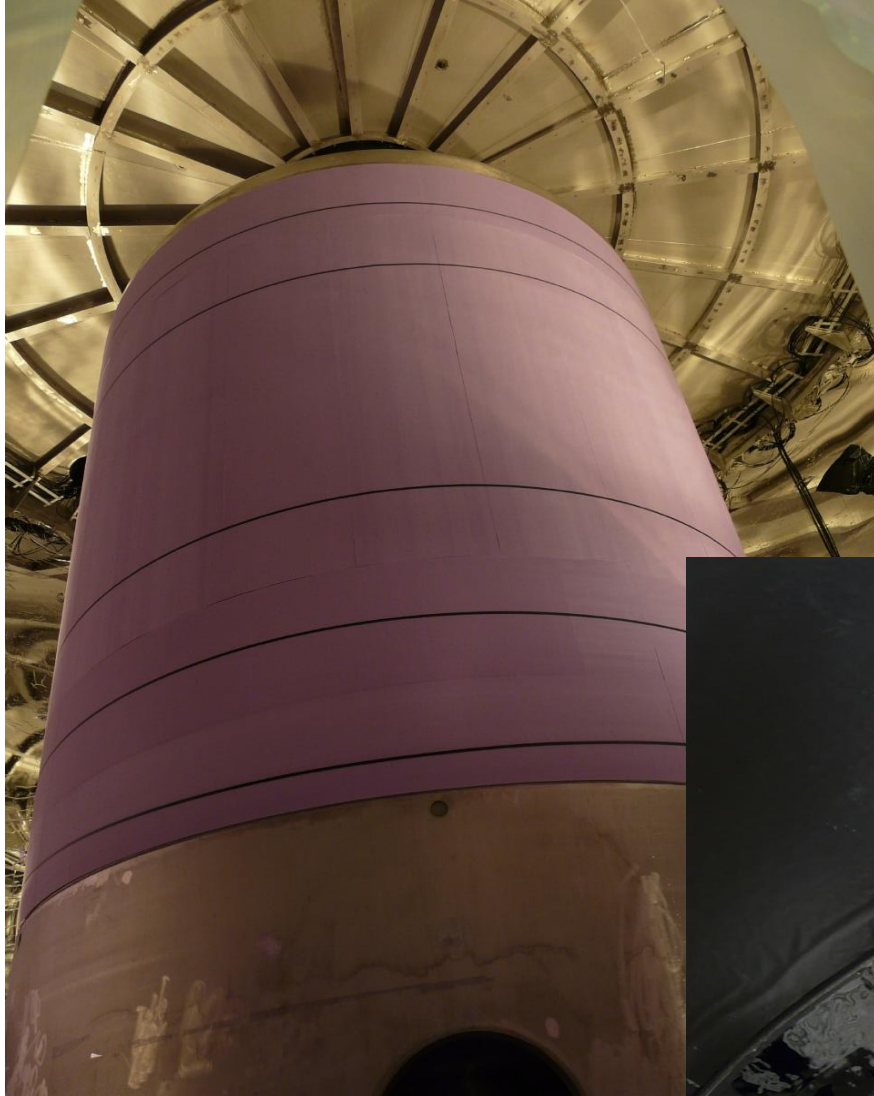
shutter

Safety disk for insulation vacuum after screw removal



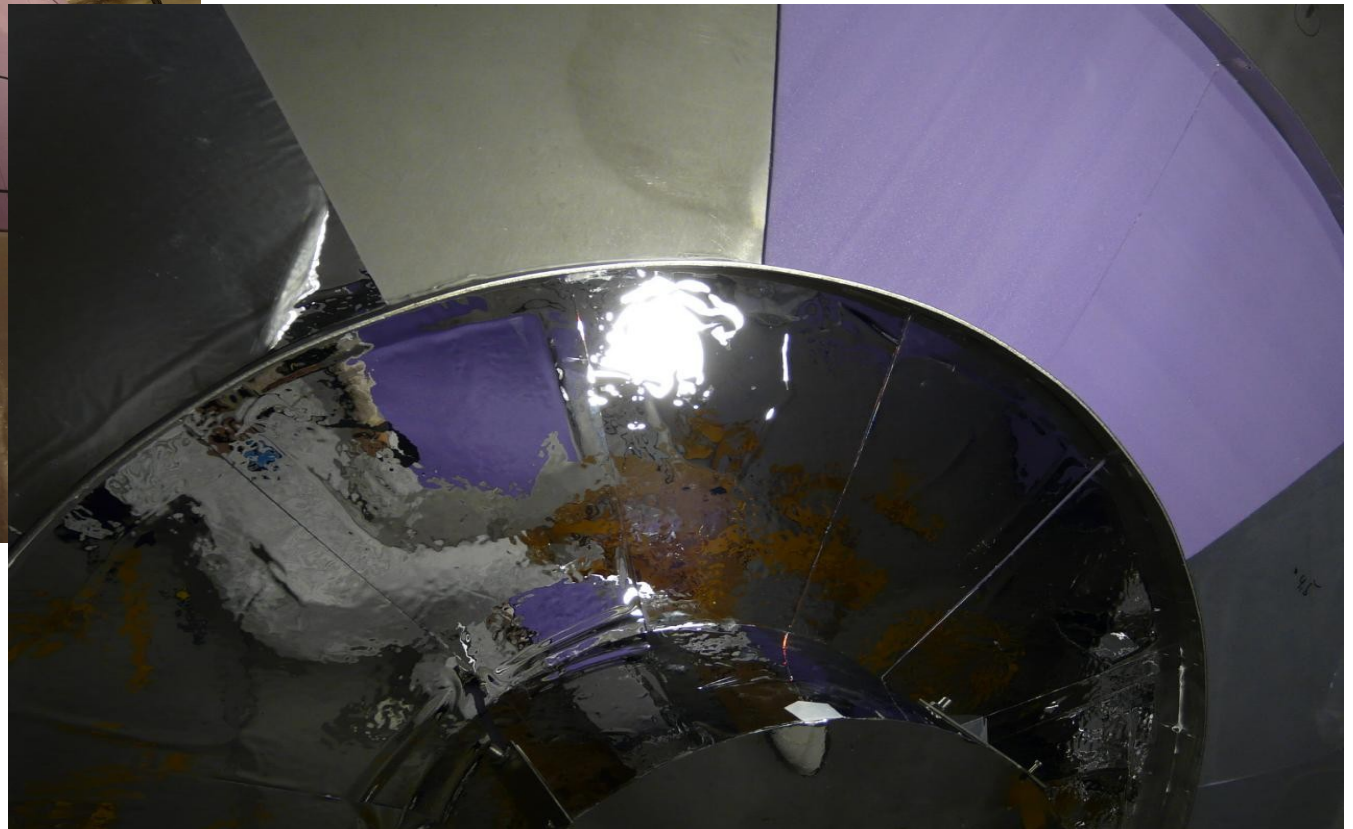


In addition: mounting of thermal insulation



at the cylinder

at the bottom head

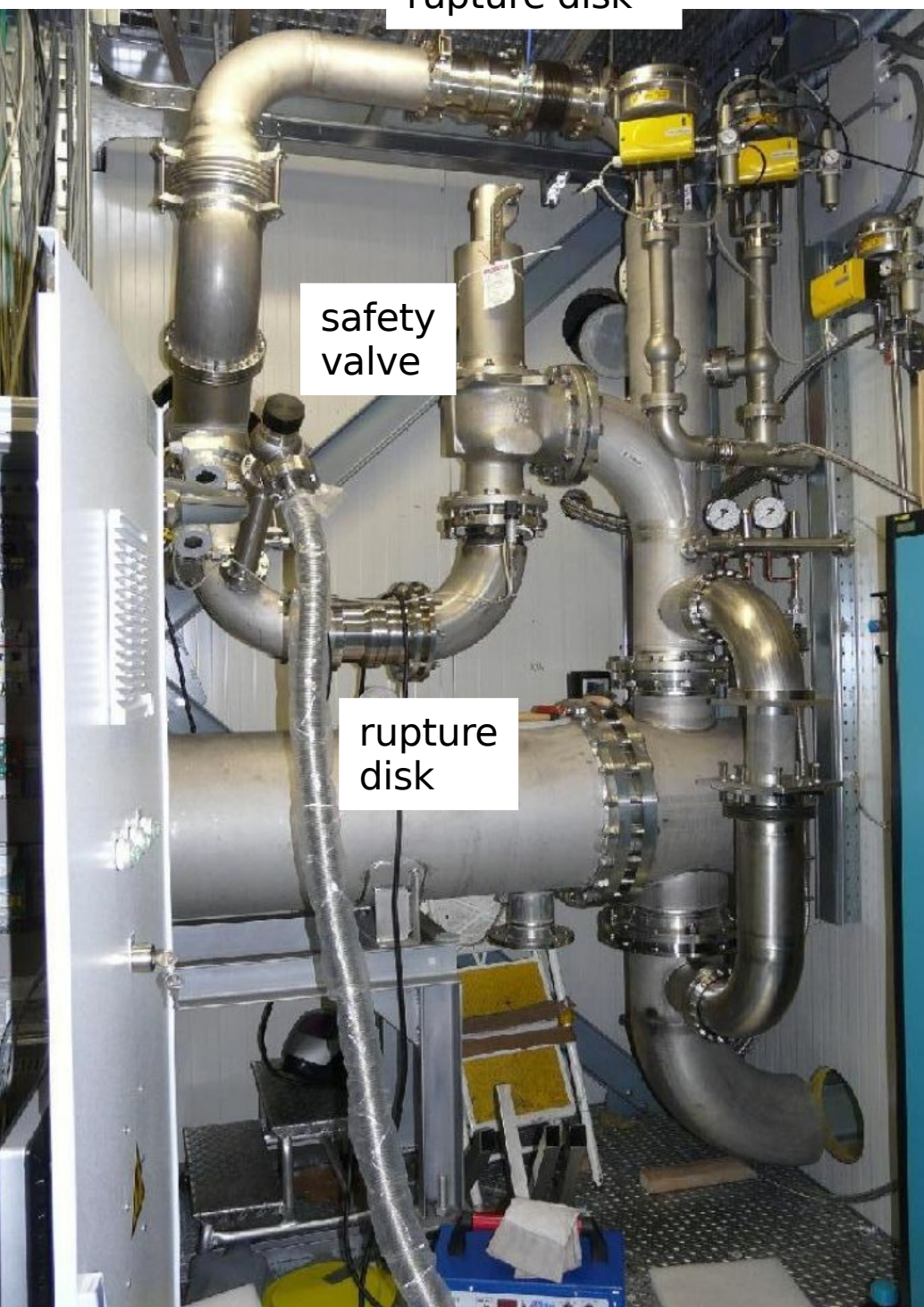




rupture disk

safety valve

rupture disk



Valve box



PLC cabinet
connection to LNGs safety ready



WEB interface of PLC (under construction)

GERDA cryostat

Status date: 2009-09-24 15:40:00
Select group: [Water](#) [Temperature](#) [Level](#) [Pressure](#) [Vacuum](#)
[Help about](#)

Overview
[Status tables](#)

Protected mode
[S7 status](#)

Help

Manuals

General PID

Done

Infra.-Control
errors: 0 warnings: 2

Pressure Control
errors: 2 warnings: 3

Temp. Control
errors: 0 warnings: 46

Level Control
errors: 0 warnings: 10

Vacuum Control
errors: 0 warnings: 6

Water Tank Control
errors: 0 warnings: 7

LIN
LAr

PC inside PLC cabinet is WEB server, read/write data from SIMATIC S7 PLC via TCP/IP access

GERDA cryostat Pressure

Status date: 2009-09-24 15:48:53

Select group: [Water Temperature](#) [Level Pressure](#) [Vacuum](#)

[Help about Pressure](#)

[Overview](#)
[Status tables](#)

[Protected mode](#)
[S7 status](#)

[Help](#)

[Manuals](#)

[General PID](#)

HS330 key

enable

Module Pressure

active

Mode

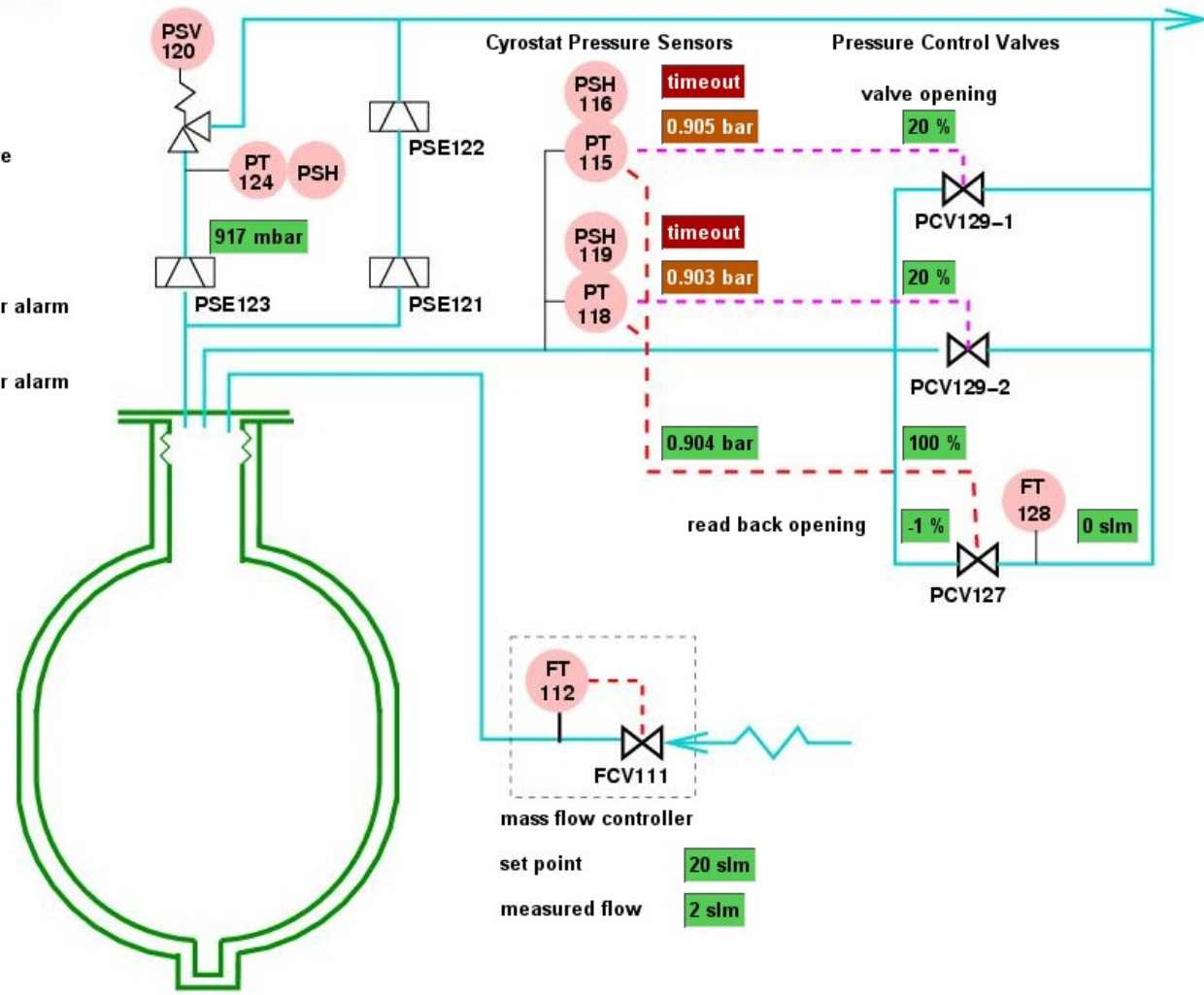
Automatic

Select PT115 for alarm

active

Select PT118 for alarm

active



GERDA cryostat Pressure

Status date: 2009-09-24 15:50:35

Select group: [Water Temperature](#) [Level Pressure](#) [Vacuum](#)
[Help about Pressure](#)

[Overview](#)
[Status tables](#)

[Edit config](#)
[Set parameters](#)
[S7 status](#)
[Normal mode](#)

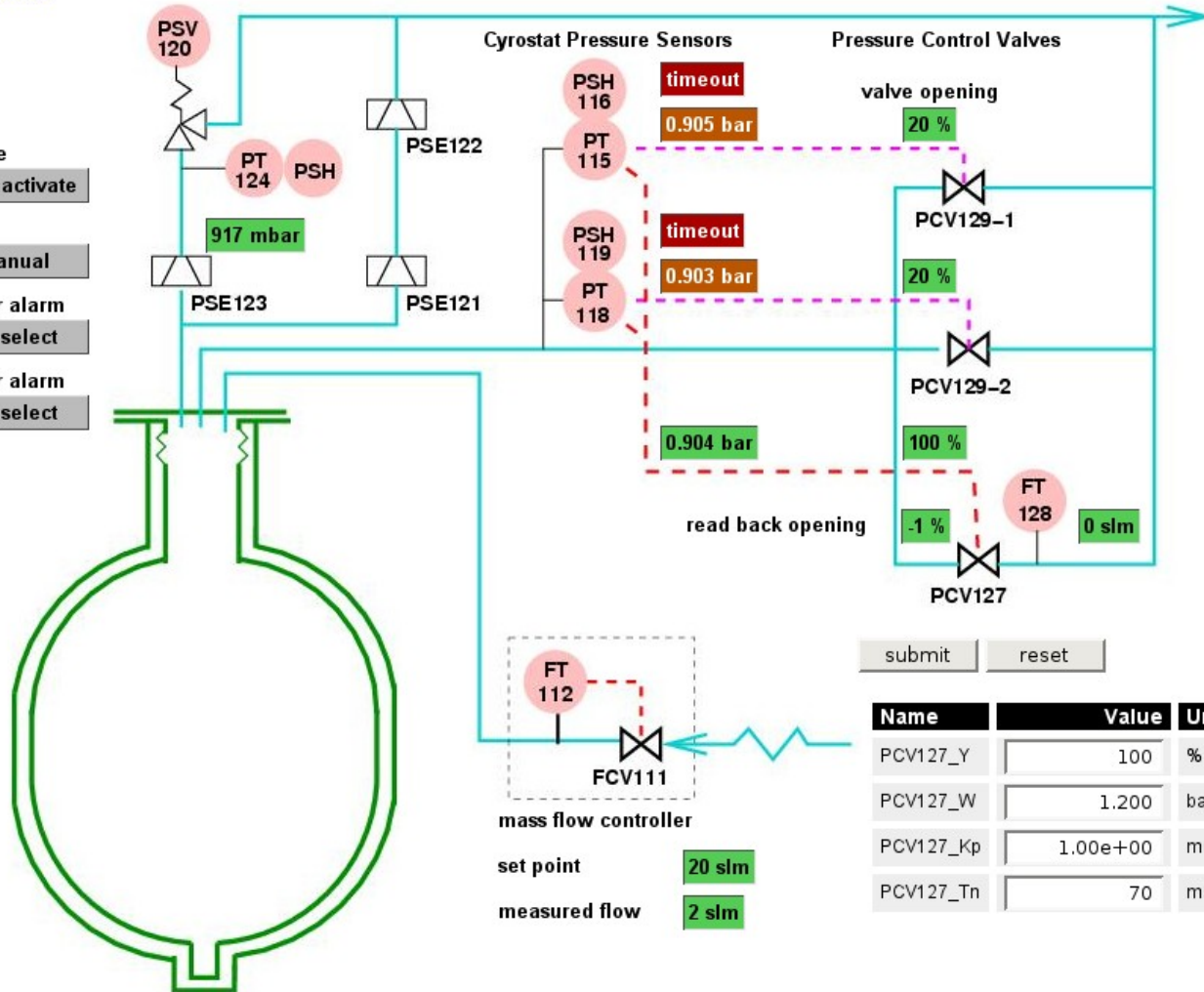
[PLC source code](#)

[Help](#)

[Manuals](#)

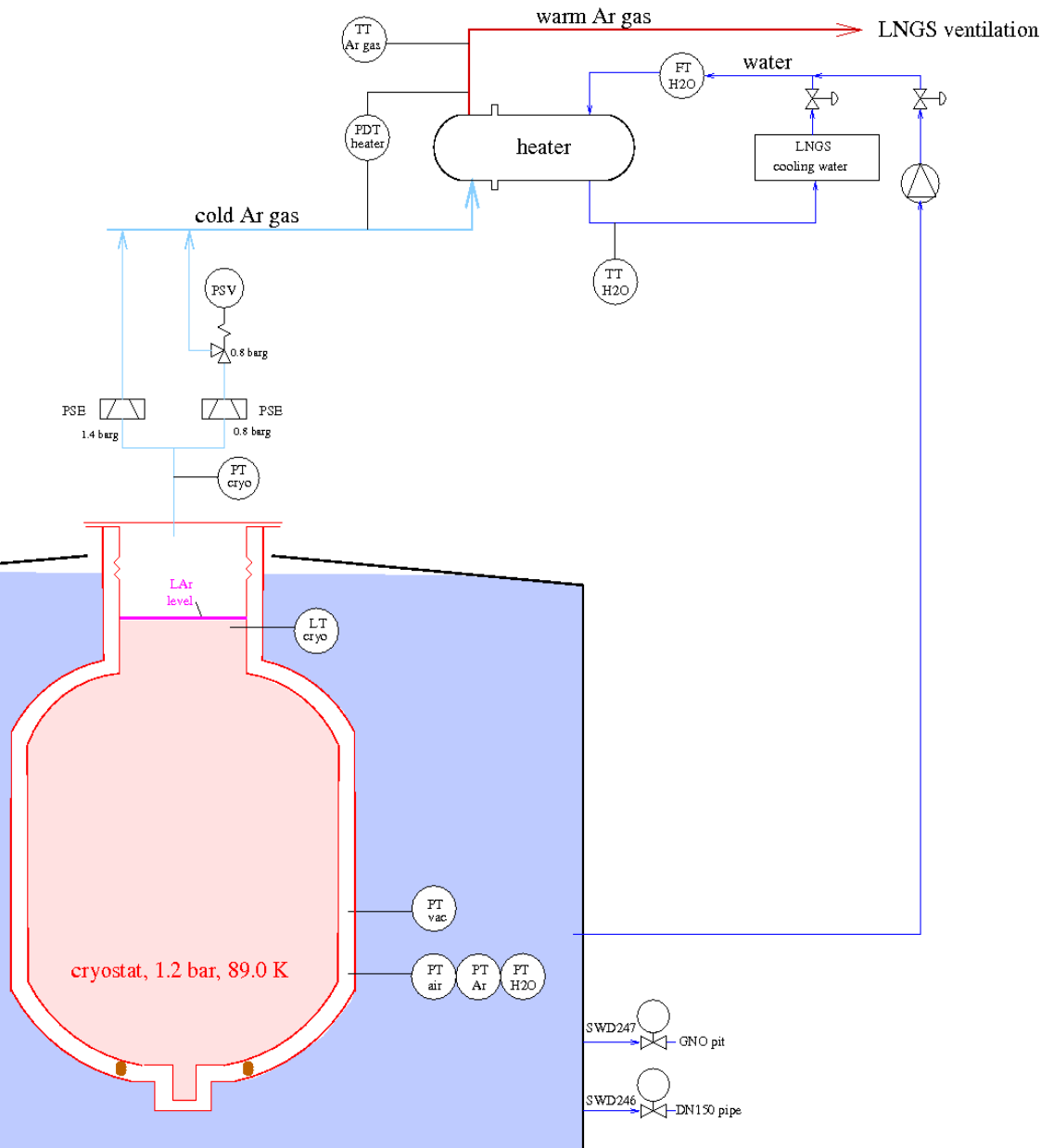
[General PID](#)

- HS330 key**
 enable
- Module Pressure**
 active deactivate
- Mode**
 Automatic manual
- Select PT115 for alarm**
 active deselect
- Select PT118 for alarm**
 active deselect



Name	Value	Units
PCV127_Y	100	%
PCV127_W	1.200	bar
PCV127_Kp	1.00e+00	mult
PCV127_Tn	70	msec

Information for LNGS safety



via MODBUS:
-10 analog values
- status bits

via cable 5 signals:

- PLC working
- increase ventilation
- drain water
- evacuate Hall A
- close highway+lab

state	P_cryo bar(abs)	P_vac mbar	level	P_xxx mbar	Δp_h mbar	T_Ar.gas Celsius	Flow_wat l/sec	T_water Celsius	Incr. Vent.	Drain Water	Evac HallA	Evac LNGS
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green	<1.5	<1E-4	ok	ok	<10	>2	>5	>6					
yellow													
Y1				N2>1E-4									
Y2			too high										
Y3							<5						
Y4	>1.5												
Y5								2-6					
orange													
O1				Ar>1E-4						x	x		
O2				wat>1E-4						x	x		
O3		1E-4<p<0.1								x	x		
O4					10<p<30				x	x	x		
O5						-5<T<+2			x	x	x		
red													
R1		>0.1								x	x	x	
R2					>30					x	x	x	
R3						<-5				x	x	x	
R4								<2		x	x	x	
R5*					>30	<-5		<2		x	x	x	x

Δp_h = pressure drop heater, 10 mbar ~ 250 Nm³/h argon gas, 30 mbar ~ 2500 Nm³/h
 * for R5: any combination of 2 conditions of the 3 has to be true
 if more than 1 sensor: analog = take average (autom. sensor disable in case or failure),
 digital = both have to give alarm

Commissioning Plans

- finish last pipings
 - LAr filling line (this week)
 - water connection to LNGS cooling water
 - connection to LNGS ventilation (ordered)
- evacuate cryostat & another He leak test (start this week)
- fill cryostat with argon gas at some overpressure
- test behaviour of pressure control valves, adjust PI parameters (~ 2-3 days)
--> ready for cool down + filling

- cool down + filling (3-4 weeks)
--> ready for detectors

- test active cooling (4 weeks)