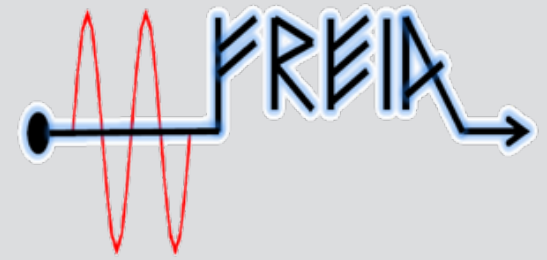




UPPSALA  
UNIVERSITET



# ESS weekly meeting (2021 W41)

A. Miyazaki et al.

# General planning no major change



Michal Sienkiewicz and Marcin Wartak from IFJ PAN would like to visit us from Oct 20<sup>th</sup> to 22<sup>nd</sup>  
 → Are they really coming next week? Confirmation?

Cedric from Orsay will join us from Oct 27<sup>th</sup> to Nov 5<sup>th</sup>  
 → Confirmation?

FREIA Planning		2021-10-06																	
		September				October				November				December					
Equipment		Responsible		6	13	20	27	4	11	18	25	1	8	15	22	6	13	20	27
		week #																	
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51		
Liquefier & 2K pumps	Esat	Yellow	Yellow	Yellow	Blue	Yellow	Yellow	Yellow	Blue	Blue	Yellow	Yellow	Yellow	Blue	Blue	Yellow	Yellow		
RF power stations	Mykhailo			Green	Green			Green	Green	Green				Green	Green	Green	Green		
Cryomodule test stand	Akira	Yellow	Yellow	Green	CM04	Yellow	Green	CM03	Yellow	Yellow	Green	CM06	Yellow	Yellow	Yellow	Yellow	Yellow		

We are here

In Oct and Nov, Akira will be physically away from Sweden but remotely lead the project from Germany



# W40 & W41 progress



week		W40											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		4-Oct		5-Oct		6-Oct		7-Oct		8-Oct		9-Oct	10-Oct
		m	a	m	a	m	a	m	a	m	a		
present CM	<b>CM04</b>	start warming up	disconnect things except for cryogenic lines					warming up completed					
next CM	<b>CM03</b>	doorknob mounting						waiting in the docking area					
next next CM	<b>CM06</b>	preparation at Orsay											

week		W41											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		11-Oct		12-Oct		13-Oct		14-Oct		15-Oct		16-Oct	17-Oct
		m	a	m	a	m	a	m	a	m	a		
previous CM	<b>CM04</b>	disconnect cryogenic lines	swap modules	filling dry N2		doorknob dismounting	outgoing test (LEMO, VNA) shock sensors	activate shock sensors, close the box		waiting in the box			
present CM	<b>CM03</b>	water leak check		connect cryogenic lines	beam pumps, leak check	beam vacuum pumping				RF calibration			
next CM	<b>CM06</b>	preparation at Orsay								departure from Orsay		transport over the sea	

**We are here**

Thanks everybody for the hard work!



# W42 & W43 & W44 planning

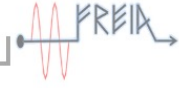


week		W42											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		18-Oct		19-Oct		20-Oct		21-Oct		22-Oct		23-Oct	24-Oct
		m	a	m	a	m	a	m	a	m	a		
previous CM	CM04	departure to ESS 9:00 am		preparation of documents				publish test report					
present CM	CM03			coupler warm conditioning				Nitrogen cooling					
next CM	CM06	transport over the sea				reception at UU morning		thermalization at UU					

week		W43											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		1-Nov		2-Nov		3-Nov		4-Nov		5-Nov		6-Nov	7-Nov
		m	a	m	a	m	a	m	a	m	a		
present CM	CM03	cooling down		4K filling	coupler cold conditioning	2K pumping	RF calibration at cold	CTS test		interlock setup	MP conditioning		
next CM	CM06	reception test LEMO		reception test VNA									
next next CM	CM07	preparation at Orsay											

week		W44											
date		MON		TUE		WED		THU		FRI		SAT	SUN
		8-Nov		9-Nov		10-Nov		11-Nov		12-Nov		13-Nov	14-Nov
		m	a	m	a	m	a	m	a	m	a		
present CM	CM03	heat load measurements		start warming up		vent insulation vacuum		warming up					
next CM	CM06			door knob mounting & water leak check								waiting in the docking area	
next next CM	CM07	preparation at Orsay											

**Goal: start warming up on Nov 9th**



Q:\Freia\freia-drop\12 Projects\ESS Testing\03 Series Cryomodule\04 Test documents\test summary\CM 04 2nd\CM04\_FREIA\_summary\_20211021\_final.docx  
 Department of Physics and Astronomy  
 Uppsala University

## Summary of CM04 2<sup>nd</sup> test

Report **Lars** 2021

### Vacuum

date	2021-06-30	2021-09-30	2021-10-08
Temperature (K)	300	2	300
Beam vacuum (mbar)	2,10E-3	2,0E-9	<5E-4
Isolating vacuum (mbar)	1000	1,8E-7	1000

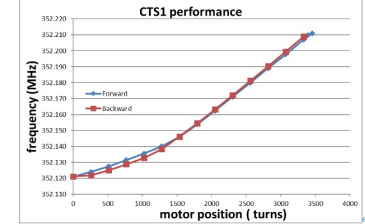
### Cavity performance

	CAV_IN	CAV_OUT	Target
Cavity name	DSPK08	DSPK11	-
f <sub>0</sub> at warm (MHz)	351.566	351.538	-
f <sub>0</sub> at 2K (MHz) @ without CTS engaged	352.121	352.104	352.090 - 352.174
Q <sub>ext</sub>	<b>Tor</b>		1.75e5 - 2.85e5
Q <sub>i</sub> (from Orsay)	<b>Tor</b>		-
Max E <sub>ext</sub> (MV/m)	12.3	12.1	>9
Field emission onset (MV/m)	-	-	-
Q <sub>0</sub> @9MV/m	<b>Tor</b>		>1.5e9
P <sub>e</sub> @9MV/m (W)	<b>Tor</b>		2.5
Dynamic heat load for CM@9MV/m (W)	14.96 +/- 1.0		-
Static heat load for CM (W)	14.54 +/- 1.0		-
df/dP (Hz/mbar)	<b>Kjell</b>		<20
CTS	Stepper motor	motor steps	678400
	setting for nominal frequency	motor position (mm)	1.325
		driving current (A)	0.6
		Limit switch position (steps)	40
	Stepper motor tuning sensitivity in linear region	Hz/ step	0.171
		(kHz/ mm)	87.4
	Piezo1 tuning range (Hz)	unipolar	604
		bipolar	695
	Piezo1 tuning sensitivity (Hz/V)	unipolar	451
		bipolar	658
Piezo2 tuning range (Hz)	unipolar	478	
	bipolar	856	
Piezo2 tuning sensitivity (Hz/V)	unipolar	566	
	bipolar	558	
Piezo2 tuning sensitivity (Hz/V)	unipolar	2.39	
	bipolar	2.83	
LFD@9MV/m in open loop (Hz)	<b>Tor</b>		-

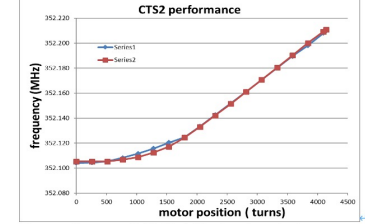


### CTS performance

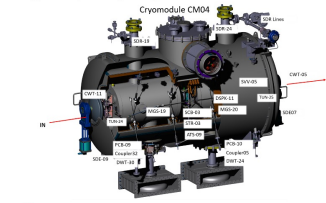
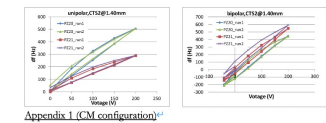
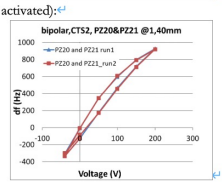
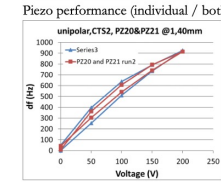
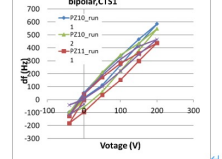
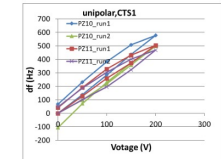
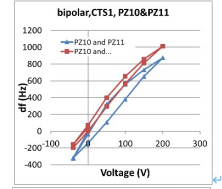
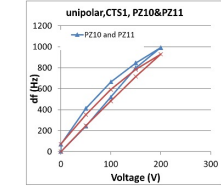
Note : CTS1 is installed for CAV\_IN (see appendix).



Note: CTS2 is installed for CAV\_OUT (see appendix).



### Piezo performance (individual / both activated)



### Appendix 2 (Stepper motor driver)

Driver type: Bogen MCC-2 Lin  
 PS voltage: 24 V  
 Motor parameters are defaults except:  
 Run frequency: 2000 Hz  
 Ramp for run frequency: 500 000 Hz  
 Run current: 0.6 A  
 Step resolution: 1/8

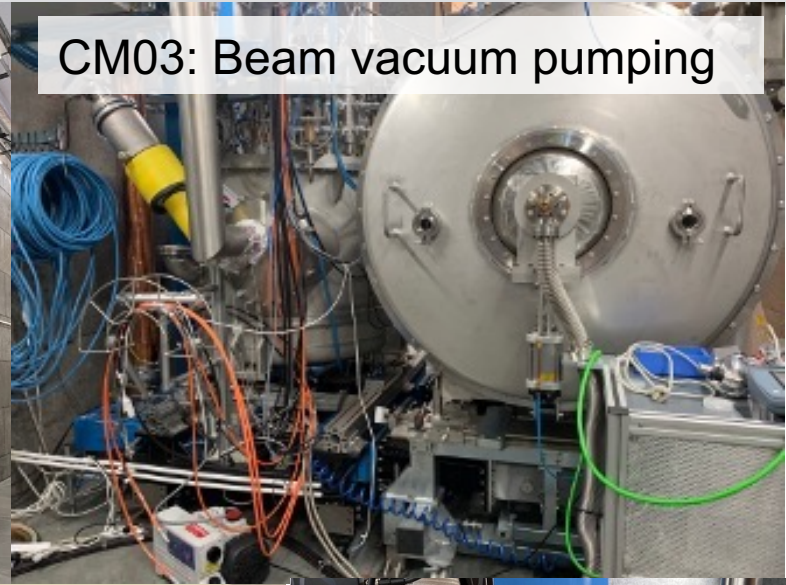
- **Tor, please write down Q and LFD**
- **Mysha, can you help Kjell to fill in df/dP?**
- **All data is already in elogbook**



# Mechanical work without Akira is perfect



Swap CM03&CM04



CM03: Beam vacuum pumping



CM04: dry N2



Cleaning bellows for insulation vacuum



LEMO OK



## CTS1

## CTS2

Turns	Limit switch (1 = closed, 0 = open)
0	1
-10	1
-20	0
-30	0
-40	0
-50	0
-60	0
-70	0

Turns	Limit switch (1 = closed, 0 = open)
0	1
-10	1
-20	1
-30	0
-40	0
-50	0
-60	0
-70	0

Positive direction

Positive direction

-60	0
-50	0
-40	0
-30	0
-20	0
-10	1 at -13000 microstep $\Leftrightarrow$ -1625 steps $\Leftrightarrow$ -8.25 turns
0	1

-60	0
-50	0
-40	0
-30	0
-20	0 At ~ -27000 microstep $\Leftrightarrow$ -3375 steps $\Leftrightarrow$ -16.85 turns
-10	1
0	1

Define 0 as 0

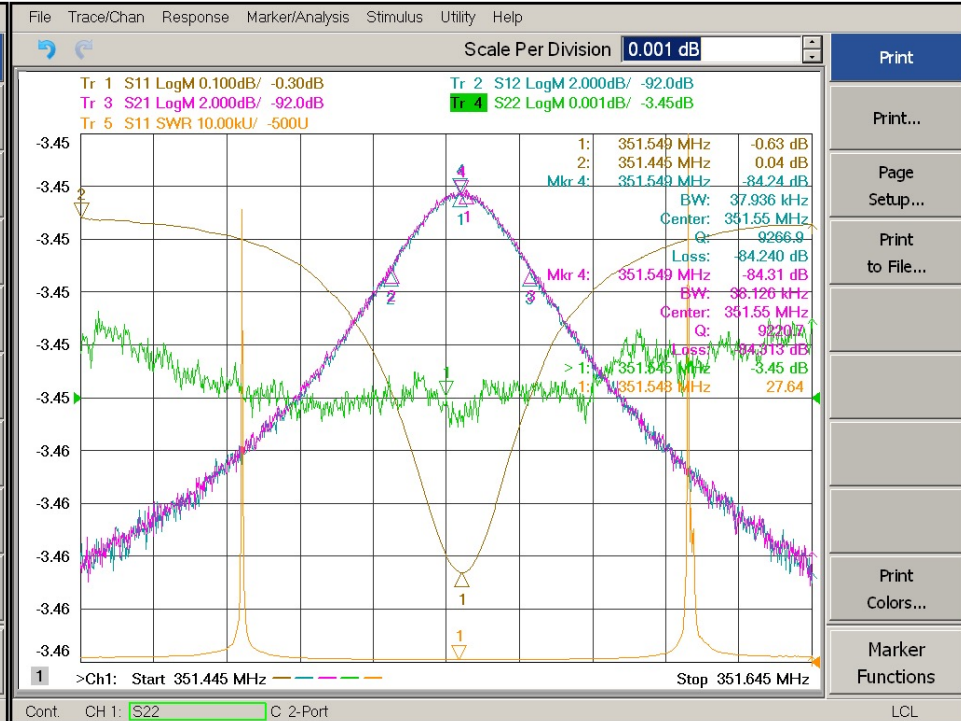
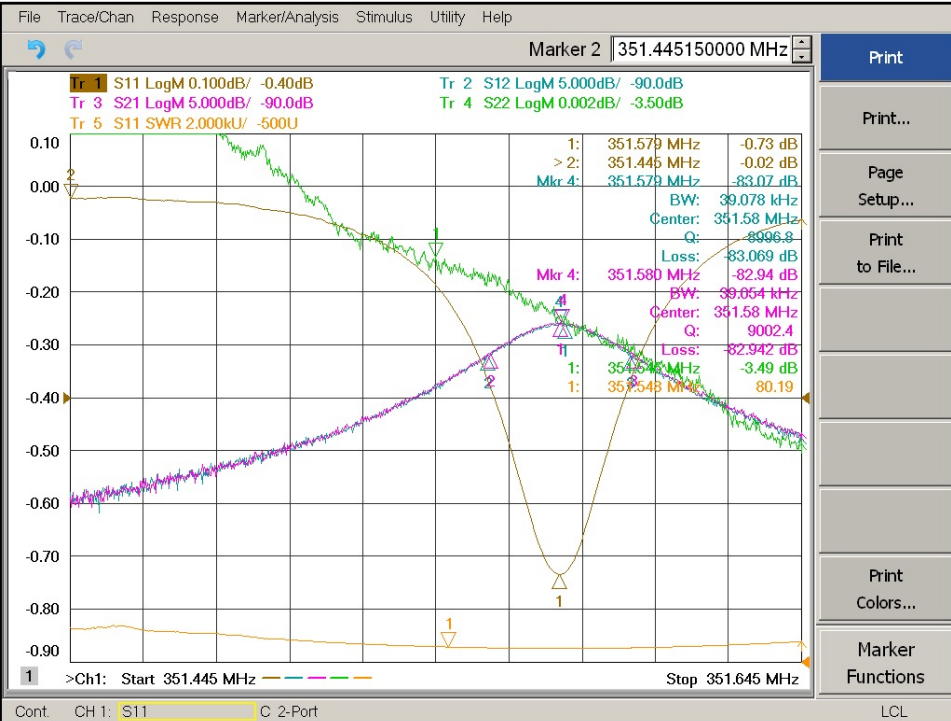
Define 0 as 0

TT06 shows 323 K when others are 300K

→ This was recognized in the last test of CM03 and TT06 was OK at cold (issue in calibration at relatively high temperature)



# CM04: outgoing test



CavIN

CavOUT

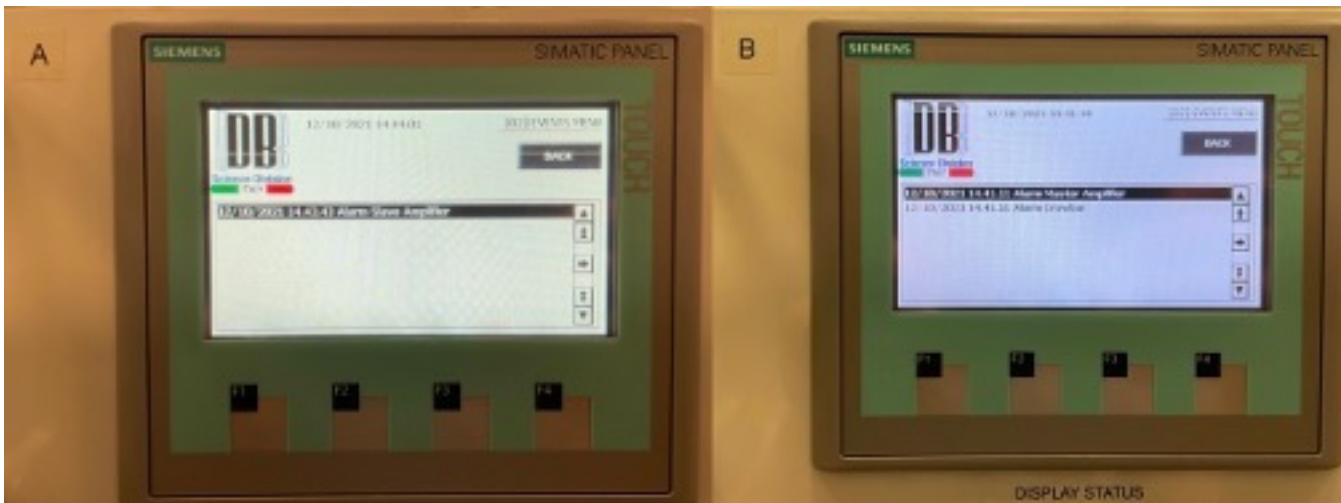
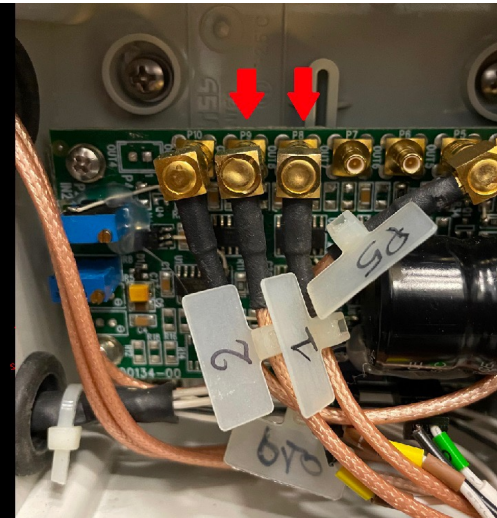
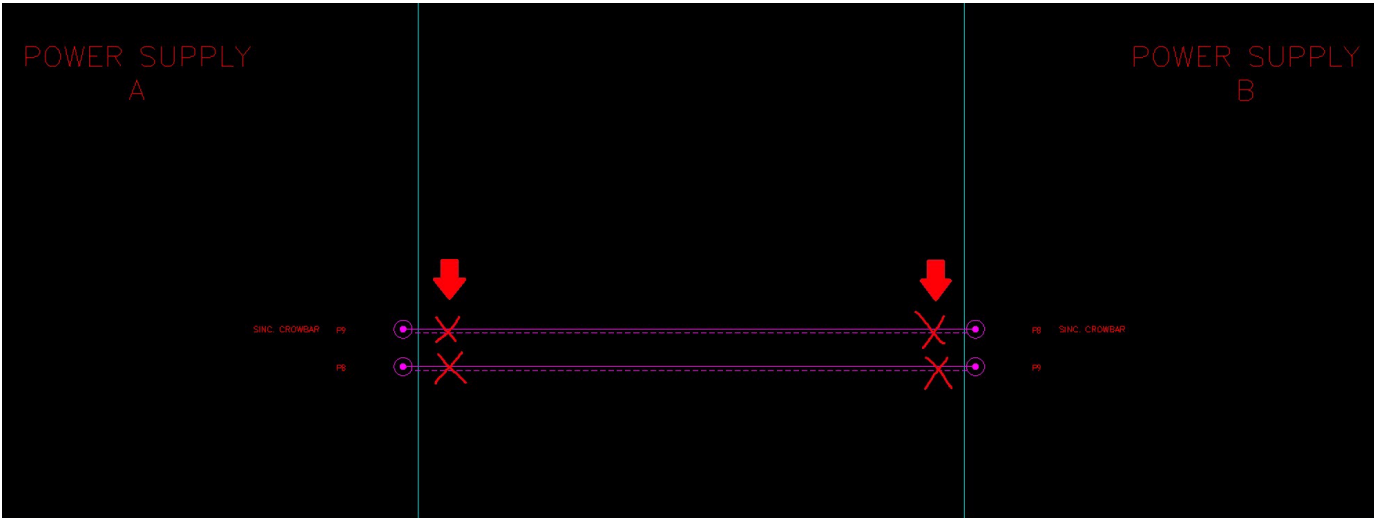


FREIA colleagues can measure cavities without help of Han Li or Akira



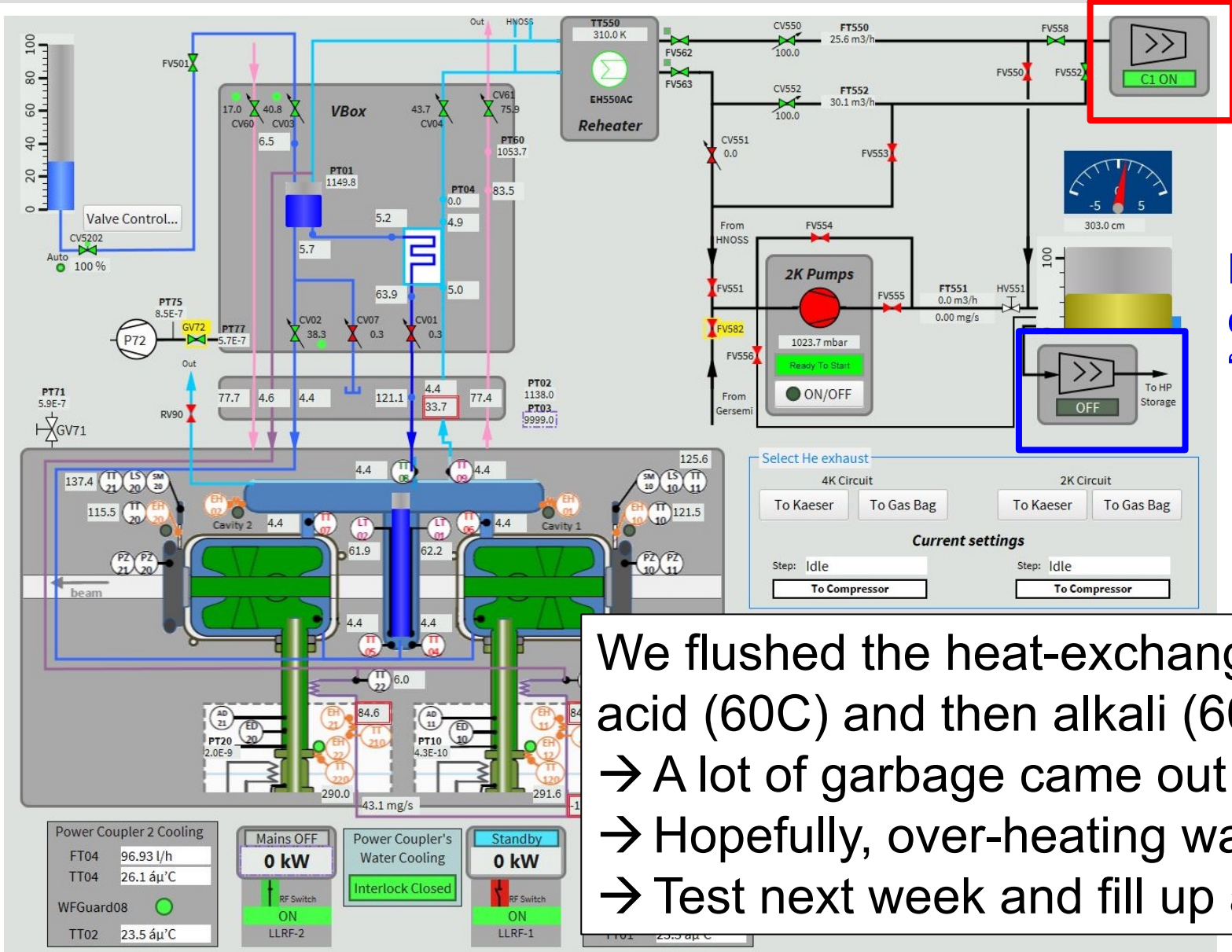
## Issues so far

we could not identify either section A or B is the origin of Crowbar IN → the crowbar cross-communication cables was disconnected



Now we can know which section induct the Crowbar and counted it for each tube

# News in Kaeser circulation compressor



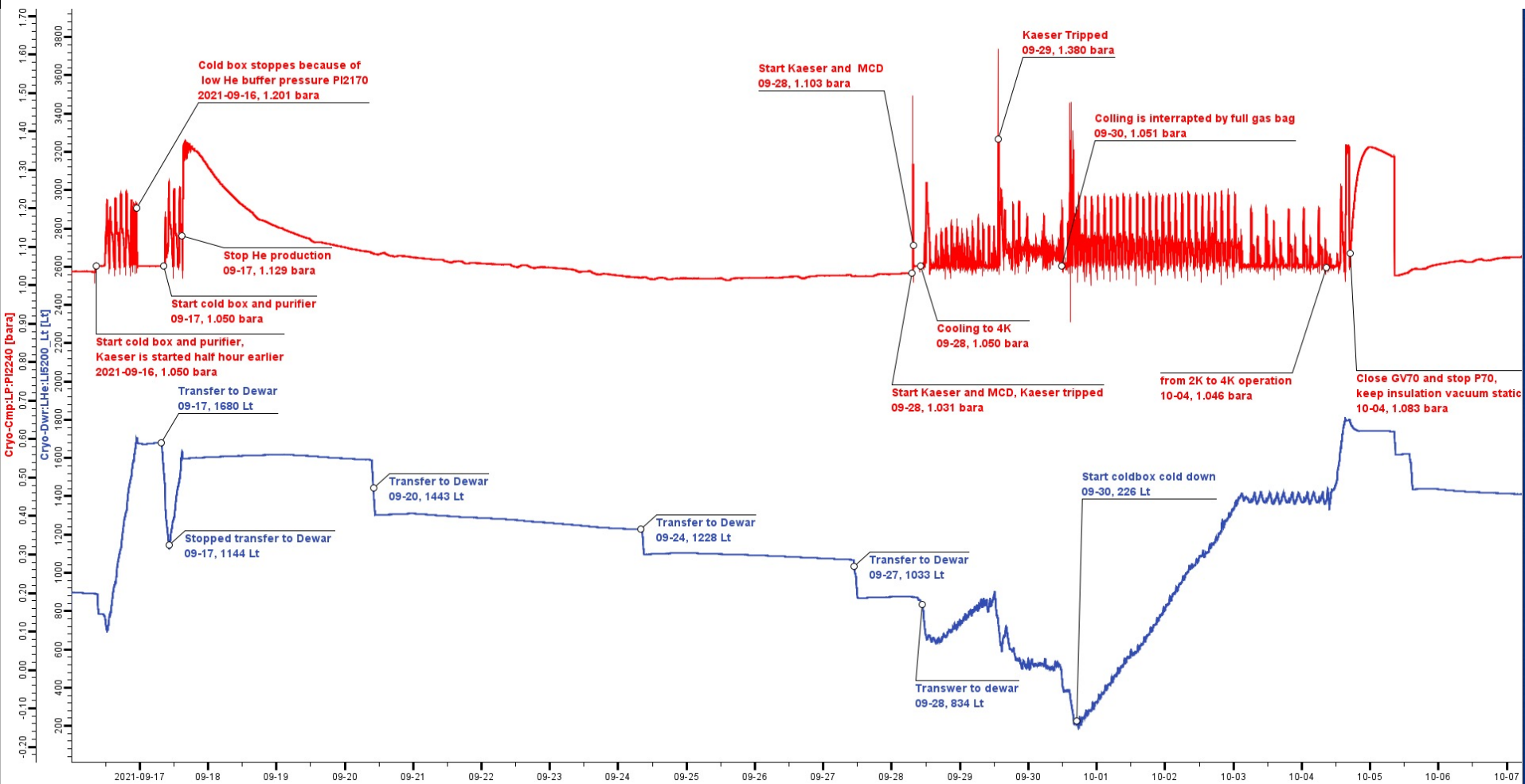
Circulation compressor  
"Kaeser"

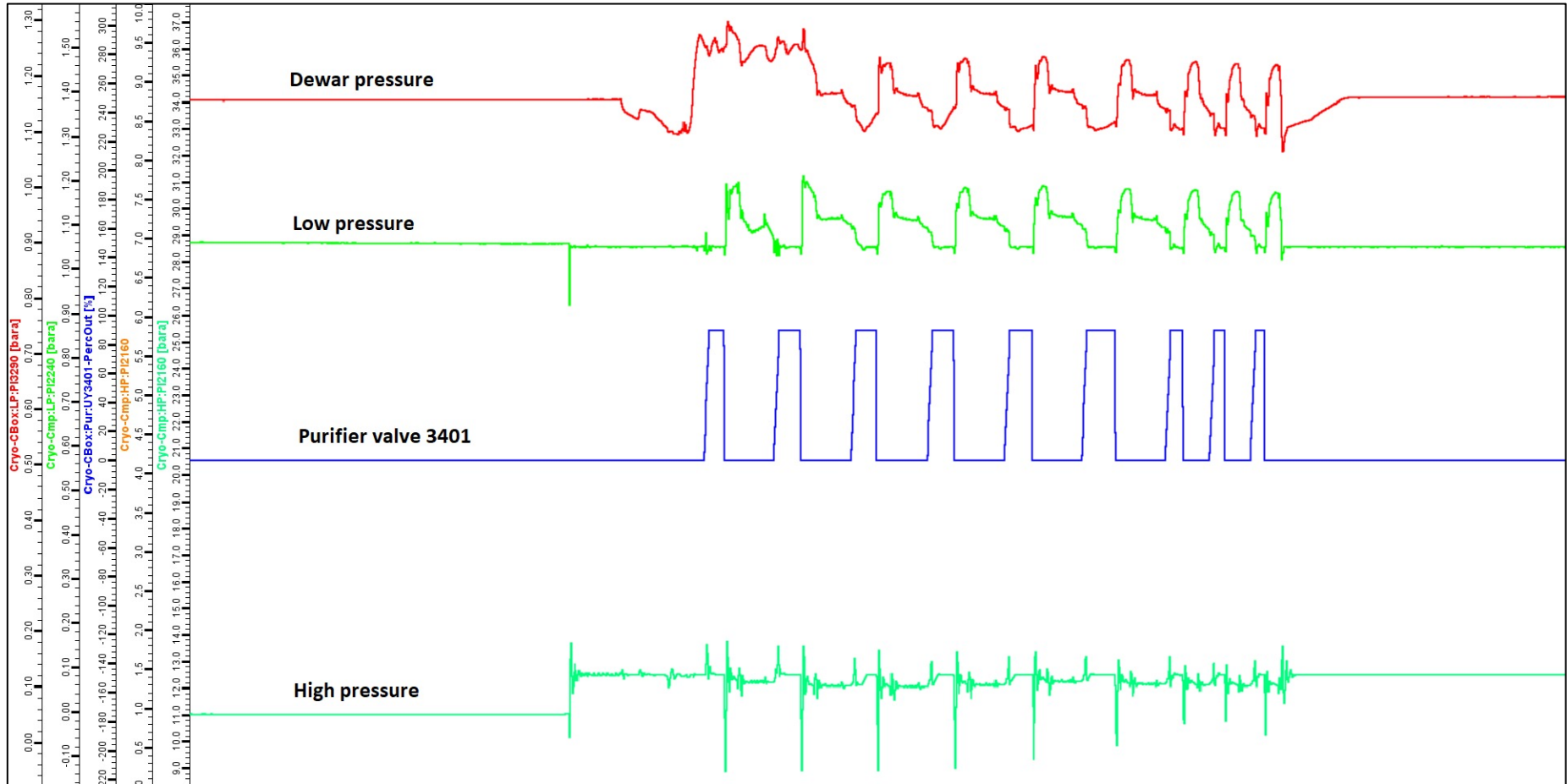
Recovery compressor  
"Bauer"

We flushed the heat-exchanger with acid (60C) and then alkali (60C)  
 → A lot of garbage came out  
 → Hopefully, over-heating was cured  
 → Test next week and fill up a Dewar?



# Cryogenic operation of CM04 summary

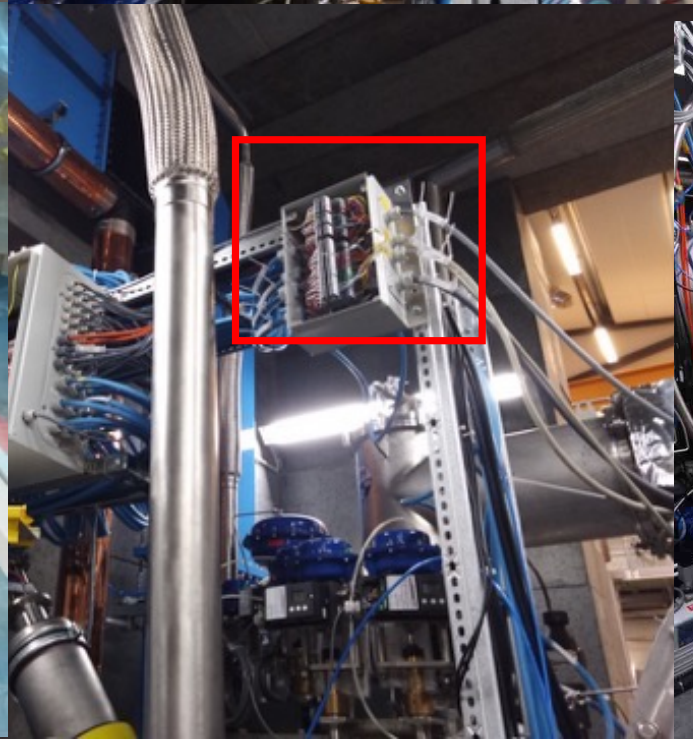
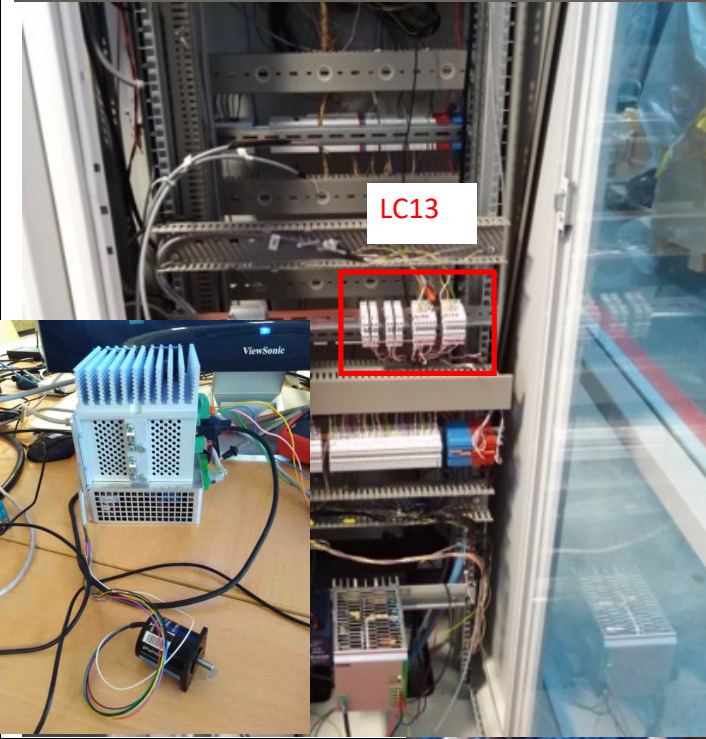
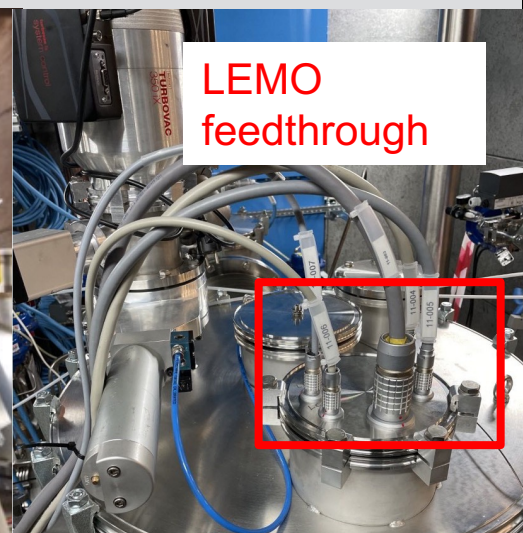
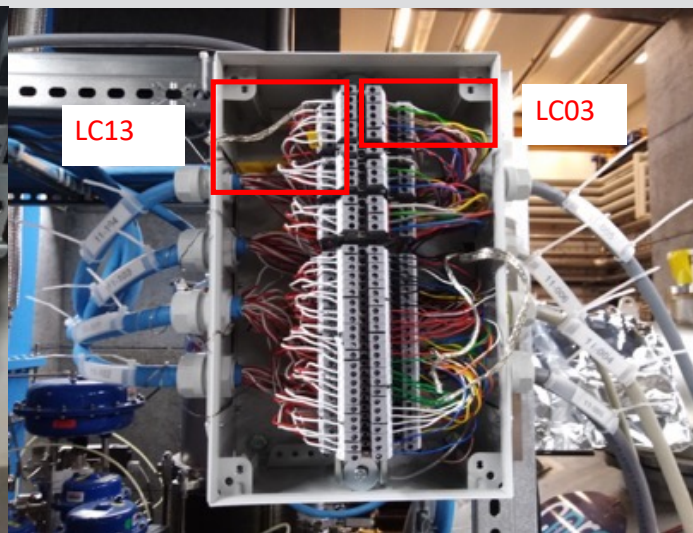
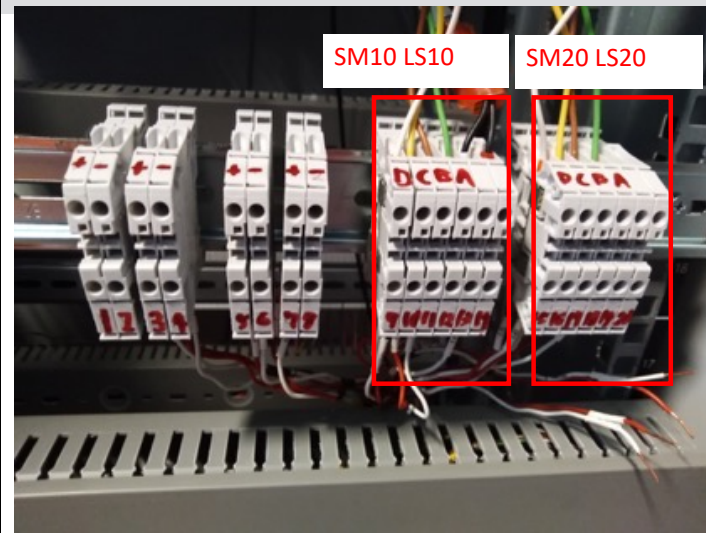
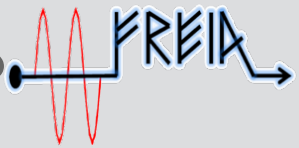




Pressure unstable → Regulation issue in the Linde system?



# How to test the new Beckhoff driver 1/2 ?





# How to test the new Beckhoff driver 2/2 ?



LEMO interface				Grey cable				Plinths bunker	Blue cable			Plinth endpoint	Grey cable 1		Grey cable 2		Grey cable 3		Grey cable 4		
LC03									LC13												
				11-005				11-104													
name	type	pin	signal ?	pair	pin	wire	screw #	pair	wire #	screw #	wire		wire		wire		wire		wire		
SM10	Stepper motor	1	D	1	1	We	1	5	9	9	We										
		2	C		2	Bn	2		10	10	Yw										
		3	B	2	3	Gn	3	6	11	11	Bn										
		4	A		4	Yw	4		12	12	Gn										
LS10	Limit switch	5	?	3	5	Gy	5	7	13	13			Bl/We								
		6	?		6	Pk	6		14	14	Bl/Rd										
SM20	Stepper motor	7	D	4	7	Be	7	8	15	15					We						
		8	C		8	rd	8		16	16	Yw										
		9	B	5	9	Bk	9	9	17	17	Bn										
		10	A		10	vt	10		18	18	Gn										
LS20	Limit switch	11	?	6	11	Gy/pk	11	10	19	19											
		12	?		12	Rd/be	12		20	20											

