# PS Production, Repair and Documentation Status

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Bundesministerium für Bildung und Forschung



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- Production of new Power Supplies
- Test-stand
- DCD AVDD voltage limit
- documentation

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## New PS purchases

#### Purchase of new PS

- thanks to reallocation of funding from DESY, KIT, LMU, MPP, could order in total 26 sets of cards for PS
- ordered complete set of cards for PS:
  - LMU: 14+5=19
  - DESY: 4
  - MPP: 3
- additional 5 boards each for OVP, and 2xBipolar cards ordered to complete parts for 5 additional PS
- order placed at Binder 2nd July 2021
- all cards have been delivered by Binder by 6th of December 2021 latest
- the DCDC boards ordered at Binder already have the 15mA fix (updated design)

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#### Completing cards inherited by Stefan

- Carina Schlammer (MPP) finished work on additional 5 DCDC boards
- additional 5 OVP boards, and 5x2 sets of Bipolar cards (2 different layouts) from order at Binder (previous slide)
- remaining cards inherited from Stefan
- should give 5 additional PS

#### Missing parts

- the delivery date in December governed by funding requirements (money had to be spent till end 2021)
- due to current shortage of electronics delivery times for many components uncertain or extremely long
- agreement with Binder to deliver unfinished Boards if single components can not be delivered in time for the December delivery date
- Binder provided list of missing parts
- list shown on next slides (as of 10. Dec. 2021)
- the OVP boards need to be calibrated and tested
  - in contact with Piotr Kapusta (Krakow) who kindly took over that task
  - can only start after finishing OVP boards (around 22. June 22 ???)

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- a first batch of missing parts has been delivered from Binder to LMU
  - integration of these components has not been started yet
  - for most of the components it is planned to assemble them "in house" (either by me, or our electronics workshop)
  - there are at least 2-3 components which have to be done by a company

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- for some components replacements have been found and purchased
- in particular for resistors: moving away from automotive standard helped

Bipolar-Gates			
part ID	description	anticipated delivery	comment
ADUM3441	dig. insulator	16 Aug 22	16 pins

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part ID	description	anticipated delivery	comment	
DP83848	IC	20 May 22	4x12 pins + grounding pad (company)	

Bipolar-Output-I	<sup>D</sup> rec. Sense		
part ID	description	anticipated delivery	comment
resistor 21R ADUM3441	dig. insulator	2 June 22 16 Aug 22	16 pins

OVP				
part ID	description	anticipated delivery	comment	
B320	diode	22 June 22	2 pins	

DCDC-boards	(both)	
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part ID	description	anticipated delivery	comment
HR2220V801R-10	Ferrite inductor	27 May 22	easy mountable, 2 solder spots
			(non opt. replacement HI2220P701R-10)
ADUM1250WSRZ	digital isolator	3. Aug 22	8 pins, should be doable self

DCDC board 2			
part ID	description	anticipated delivery	comment
NC7SZ125M5x	UHS buffer	2 March 23	replacement found with Stefan,
			already ordered and delivered

DCDC board 1			
part ID	description	anticipated delivery	comment
R24-100B	DCDC converter	2 June 22	

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## KEK Test-stand

- LMU provided a Test-stand for KEK
  - the Source-Measurment-Unit (SMU), main part
  - external power supply
  - Laptop for slow control of the test stand
- MPP produced the relais-card for the Test-stand
- full load boards assembled by Bonn and MPP
- the KEK test stand has been send to Bonn for further tests and studies
- several issues during the setup:
  - lack of documentation
  - damaged hardware (next slides)
  - unclear which software version used
  - some issues more clear now, but improvement in documentation needed

- 5 Load boards provided to test PS under full load
- 5 PCBs and Glenair connectors have been purchased
- 2 of those Load boards already assembled by the Bonn group, one of those provided to DESY
- Werner Harberer (MPP) assembled the remaining 3 Load boards
- Werner sent the load boards to Bonn for further testing
- load boards for: LMU (replace the "old" prototype), DESY, KEK, Bonn?, MPP

## KEK Test-stand: damaged relais card

- during Test stand test at LMU damaged relais card
- after a "discharge" the voltage regulator stopped regulating and several ICs got "grilled"
- exact reason is still unclear
- Werner Haberer suspects might be related that relais card and PS and Fan have been powered over the same channel of one external power supply
- Werner very quickly repaired the relais card
- LMU test stand: one external power supply but relais card has its own power supply



## KEK Test-stand: External power supply

- one of the Banana sockets got pushed into the Box
- unclear where and how it happened
- regarding other problems (previous slide) consider replacement
  - use power supply at KEK??
  - if needed send one power supply from LMU



# Degradation of measurement results with the LMU test stand

- a degradation of the current measurement is observed in recent calibrations
- the spread in the current vs current measurement increased for certain channels up to a factor of 10 (most extreme case)



- looked into it together with Stefan
  - Oscilloscope measurement
  - oscillation after switching
  - seems to be not a severe issue for the calibration
- slight shift in calibration constants observed, but not significant
- still would like to understand why: Compare with measurements with KEK setup (Bonn)?!

- frequent meetings with Stefan
- current status: 7 PS at LMU

PS-Unit	comment
PS-26	replaced inrush current limiter seems to have fixed issues.
	Final calibration and tests needed
PS-88	OK. Final calibration and tests needed.
PS-89	Assembled from "remaining" parts. According to Stefan,
	the DCDC boards should be replaced (old version)
PS-57	HV biased at load, and DHPIO shows offset in voltage at
	load. Needs further investigation
PS-59	High measurement spread (see previous slides). Should be Ok.
PS-54	reported by DESY: displayed voltage at load differs
	from measured voltage at load for one channel. We did
	repair attempt, needs recheck.
PS-67	send to LMU from DESY two weeks ago. Not yet tested.

# DCD AVDD voltage limit

- modules reported to run into 5.4V voltage limit for DCD AVDD
- limited by voltage provided by the "StepDown" card (on the DCDC boards)
- the voltage limit can be set by  $I^2C$  bus
- demonstrated feasibility during 2 lab sessions
- Stefan provided detailed documentation
- needed hardware: USB programmer ( $\approx$  30 Euro), soldering equipment
- few details still open (point of access)



#### Thomas Lück

### Documentation

- documentation done on confluence page PXD PS
- Stefan puts documentation of current work on this page
  - update relais-card for Test-stand
  - update of load board for Test-stand
  - update of DCDC-boards
- started to document the Test stand: confluence link (work in progress)
- test run with MPP and Bonn colleagues (their setup)
- General PS documentation:
  - $\bullet\,$  have a pdf document giving a more general description of the PS (what does it, how does it do it,  $\dots\,$  )
  - Stefan working on it
  - Stefan asked to divide it into smaller pieces which is easier to work on, better to time-manage (discuss offline)

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- 26 additional PS have been ordered and delivered
- in addition 5 PS from "spare parts"
- Test-stand has been reproduced in colaboration with MPP and Bonn
  - will be send from Bonn to KEK
- solution for the DCD AVDD voltage has been proposed
- documentation effort is ongoing