LV Scan for TFC Issues

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Setup of the LV scan

- LV power supply.
- LV cable, split in two parts.
  - The second part is $\mathcal{O}$(10cm) long and attached to the Module before installation in the setup.
  - We have sense lines going to the point connecting both cables.
  - We have probe lines measuring the voltage at the connector on the FE hybrid.
- Multimeter to measure the LV supplied to the FE hybrid
- Internal voltage measured by the VeloPix (least stable, least accurate)
- Precision for problematic VeloPix is 2mV, for other VeloPix in tile is 5mV
- Performed a binary search to find the voltage threshold

Results for N018

- Configuring all VeloPix in the Tile in Minimal/QA mode, the TFC is fine above

VeloPix	Supply	Probe	Internal
NLO/VP1-0	1.155V	1.146V	–
NLO/VP1-1	1.155V	1.146V	–
NLO/VP1-2	1.262V	1.252V	1.228V
CSO/VP3-0	<1.100V	<1.089V	–
CSO/VP3-1	<1.100V	<1.089V	–
CSO/VP3-2	1.250V	1.237V	1.216V

- Configuring all VeloPix in the Tile in PRBS mode, the TFC is fine above

VeloPix	Supply	Probe	Internal
NLO/VP1-0	1.175V	1.160V	–
NLO/VP1-1	1.185V	1.170V	–
NLO/VP1-2	1.303V	1.286V	1.249V
CSO/VP3-0	<1.100V	<1.082V	–
CSO/VP3-1	1.111V	1.093V	–
CSO/VP3-2	1.271V	1.250V	1.215V

Results for N018

- If previously configured correctly, the TFC will remain counting correctly ramping down the voltage
- Minimal/QA mode for NLO/VP1-2
  - Configure above 1.262V supply
  - Behaves correctly until 1.245V supply
- PRBS mode for NLO/VP1-2
  - Configure above 1.303V supply
  - Behaves correctly until 1.270V supply

Results for N020

- Configuring all VeloPix in the Tile in PRBS mode, the TFC is fine above

VeloPix	Supply	Probe	Internal
NSI/VP2-0	1.170V	1.155V	–
NSI/VP2-1	1.335V	1.318V	–
NSI/VP2-2	1.150V	1.138V	–

Observations

- The observed behaviour of the TFC counters can vary a lot
  1. VeloPix updates TFC counters correctly
  2. VeloPix not counting at all
  3. VeloPix updates TFC counters once, but then stops counting
  4. VeloPix counts TFC, but wrongly (TFC signals are added in more than 1 counter)
- Depending on the supply voltage it can change behaviour
- ...there are *magic* low LV values where the TFC is correct again, but $+/-$ 5mV is not.