Four instrumentation chains with AC and DC Current Transformers (ACCT-DCCT) will equip the lines of SPIRAL2 facility to measure the beam intensity and line transmissions. These measures are essential to tune and supervise the beam, to assure the thermal protection of the accelerator and to control that the intensities and transmissions are below the authorized limits. As such, the uncertainties of measurement chains must be taken into account in the threshold values. The electronic has been designed with high requirements of quality and dependability by following different steps; from prototyping, the qualification through an Analysis of Failure Modes and Effects Analysis (FMEA) until final fabrication.

**MEASUREMENT CHAIN DESCRIPTION**

**ACCT-DCCT bloc**
- **DCCT :** Bergoz NPCT-175-C030-HR
- **ACCT :** Ganil’s Electronic Group Nanorystalline torus & winding of 300 turns
- **Shielding layers (Armco, Mu-metal and copper)** protect the sensors from external electromagnetic fields.
- **Shield plate between ACCT and DCCT minimize the disturbance produced by the DCCT magnetic modulator on the ACCT.**

**DCCT measuring chain**
- **Sensor is maintained @ 40°C**
- “Offset Compensation” card:
  - sets the zero point, with a manual command before each start of new beam tuning
  - generates the transmission signal (difference of two intensity signals)
  - distributes the intensity and transmission signals

“Surveillance” card:
- carries out moving averages of input signal
- compares it to thresholds
- sends alarms in case of overtake to the Machine Protection Systems

**ACCT measuring chain**
- “Preamplifier” is a current to tension converter. It is placed as close as possible to the transformer to minimize the noise but outside the linac room to be protected of the radioactive effects.
- “Amplitude detection” card:
  - generates the DC signal non-transmitted by the ACCT (“clamping” function)
  - generates beam intensity and transmission signals
  - distributes the intensity and transmission signals

“Surveillance” card: same as DCCT chain.

**MEASUREMENT UNCERTAINTY ASSESSMENTS OF THE SPIRAL2 ACCT/DCCT**

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The overall chain ACCT-DCCT is manufactured, validated and will be installed on the accelerator before the end of the year 2016. The characterization and the qualification should continue on site without and with beam. For example, the influence of the external magnetic fields should be quantified with SPIRAL2 in operating. The qualification will finish by tests with the other interfaced systems. Mainly, the response times between beam overrun and its cut off must be verified.