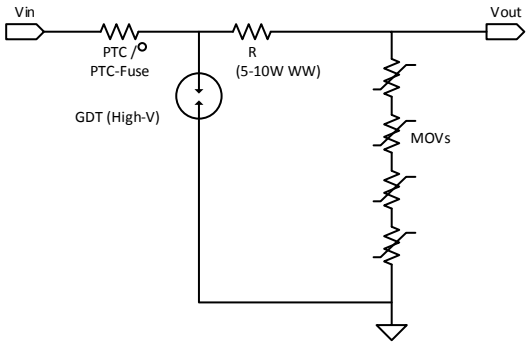

All values shall be selected such that the MOVs are not destroyed if Vin<= 4kV, to meet CAT-I 1kV, CAT-II 600V and Vout <= 1.2kV under any operating conditions. (Which will give us 200V overhead. The input divider is 1,5kV-rated and the coto relays are1,0kV-Switching voltage rated with 1,5kV withstand if open)

1. Normal Operation:
GDT and MOVs high-impedance and non-conductiong

2. Fast Overload Transient:
MOVs kick in first, limiting the voltage after R. The current trough R and the PTC cause the PTC to heat up. The energy is dissipated trough the PTC+R+MOVs, the GDT is too slow to catch this fast spike.

3. Long/Permanent Overload by high energy source:
MOVs kick in first, resulting in a voltage divider PTC-R. The PTC will not heat up immediatly, so the GDT sees a voltage over it's arc-voltage for a signifcant ammount of time. The GDT starts conducting and shorts the PTC to ground. Due to the high current flow, the PTC will heat up immediatly and disconnect the circuit. The MOVs provide the clamping in this case, and do not blow because of the high-energy overload. The PTC might blow, resulting in an open circuit (not very likely, but a series chip-fuse might help)

Worst-Case Scenario:
The unit has auto-ranged in it's lowest measurement range (200mV FS). The leads are disconnected. The user plugs the unit into an direct overload condition. The CircuitUnderTest is capable of delivering a very high energy, has a very low impedance at the measured point and can deliver the energy pretty fast. The Input Protection kicks in and limits the voltage to 1,2kV. The protection diodes in the buffer-frontend limit the voltage and are conduction a large current (several milliamps). The input stage is disconnected after the PTC has heated up and goes high-resistance. The range relais will switch 1,2kV divided by the two R's in series with a few milliamps in this case. After that, it has to withstand the clamped overload at ~1.2kV. All limiting resistive elements will operate also slight above their specs due to the large voltage drop and resulting current due to the direct connection to the diode clamp. Thus, some elements might fail after Many (depended on the component quality and de-rating effects) direct and heavy overload conditions. Nevertheless, the „expensive" circuit elements will always be protected, except for the range relais.