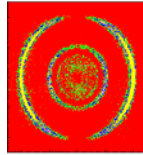


The SP1 and VL1 protective circuits



RoentDek
Handels GmbH
Supersonic Gas Jets
Detection Techniques
Data Acquisition Systems
Multifragment Imaging Systems

RoentDek has developed a passive protection circuit being part of most decoupling units such as **FT12TP** and **HFSD** (also part of **FT4TP/FT16TP**). Its purpose is to damp adverse effects from discharges on detector elements during erroneous and uncontrolled operational conditions, as safeguard for follow-up signal amplifiers or digitizers. This protective circuit is also available in form of the **RoentDek SP1** product as separate unit:

As part of a signal transmission chain the **SP1** will linearly damp fast signals with amplitudes between 0.7 and -0.7 V by about 20% (2 dB). Pulse shape may only be slightly altered from the circuit's upper bandwidth limit (approx. 200 MHz). Signal amplitudes outside this range will be limited in a non-linear response function with the purpose to drain excessive charge flow which would damage sensitive electronic circuits beyond. Due to circuit latency (about 10 ns) there is no immediate amplitude cut-off so that the protection of follow-up circuits cannot be perfect. Extremely intense discharges may destroy parts of the protection circuit which will in most cases cut the signal line to the follow-up electronics (fuse-type protection function). Although the **SP1** has proved very effective, **RoentDek does not** guarantee that using an **SP1** will prevent damage to follow up electronics under any circumstance.



RoentDek SP1 (above) and

RoentDek VL1 (left)

The **RoentDek VL1** is an active voltage limiting (amplifying) device (requiring 12 V DC input from an external mains adapter) for cutting off signal amplitudes above +/-2 V, having a 1:1 linear input response for signals within the -2 to +2V range (within bandwidth range of approx. 1- 200 MHz). Signals with other amplitudes will experience a non-linear response, effectively limiting the maximum output amplitude to < +/-2 V. This will protect follow-up electronics (for example a CFD circuit or an ADC) from excessive input voltages that may be present before the **VL1**.

The **VL1** will tolerate input amplitudes of up to 7 Volt DC or 13 Volt signal peak (excess duration < 10 ns, mean signal power < 7 V of DC equivalent). Higher voltages may damage the **VL1** but will not be transmitted to the output (protective “fuse” function). Nevertheless, **RoentDek** will not guarantee that a **VL1** will prevent damage to follow-up electronics under any circumstances.

As add-on functionality, the output signal height can be attenuated to account for limited input range of follow-up electronics, such as the **RoentDek fADC** device. Please note that the attenuation setting will not change the range of linear response on the **VL1** input side.

The application range of the **VL1** can be expanded to higher input amplitudes by a preceding attenuator (e.g. **RoentDek pAtt** or **pInv&Att**). However, the **VL1** output amplitudes will always be < +/-2 V.