

Application note

Power capability of DRU

The DRU extension is connected in parallel to the APS amplifier.

The operating mode is like a current sink/source. The DRU tries to provide as much measured EUT current as possible, with respect to its dynamic capabilities and nominal power limits.

Consequently, the APS provides the remaining current and especially current harmonics with higher frequencies.

Generally:

- The DRU has a large signal bandwidth (-3 dB) from DC to 400 Hz.
- The DRU has no short time power/current capability.
- Within its nominal power specification, the DRU supports a voltage up to 500 V.
 - o In source mode, the DRU provides zero current when the voltage exceeds 500 V.
 - o In sink mode, the DRU works with voltages up to 650 V but with less efficiency and a given power derating (power derating begins at 570 V and ends at 650 V):

$$P = \frac{2500W}{1 - \frac{500V}{U}}$$

- If the APS has an optional AC voltage range (Option UT), the DRU is connected on the primary side of the additional transformer. Hence the voltage ratio "N" is calculated by $N = \frac{270V}{U_{range}}$.

- The max EUT current (DC to 200 Hz) is

$$I_{EUT} = \frac{P_{DRUmax}}{U_{EUT}} + N * I_{APS'} \quad \text{if } U_{EUT} \geq \frac{P_{DRUmax}}{N * I_{DRUmax}}$$

$$I_{EUT} = N * I_{DRUmax} + N * I_{APS'} \quad \text{else.}$$

($N * I_{APS'}$ as specified in the APS power characteristics diagrams)

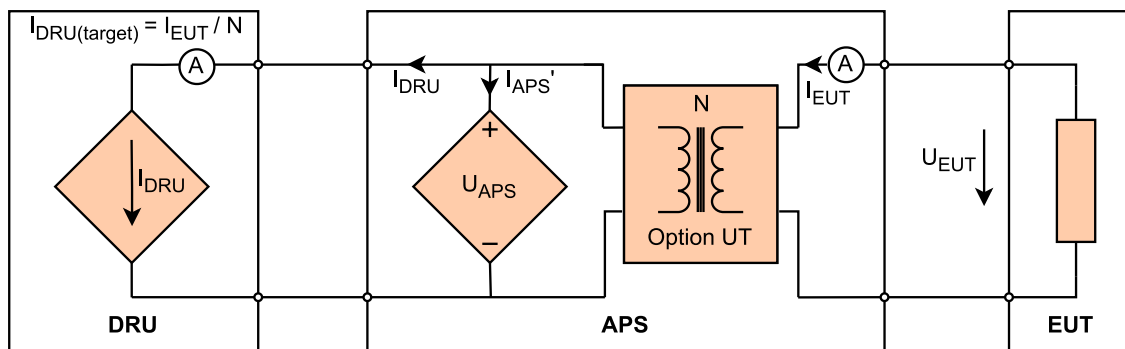


Fig. 1: System configuration with DRU and APS with Option UT

Examples for DM 60000/DRU at single phase:

The DRU can provide 20 kW sink power and 16.5 kW source power and 100 A (RMS), see [datasheet](#).

The remaining current/power is provided by the APS (with respect to its power limits).

- A. APS amplifier is configured to a standard output voltage range (e. g. 240 V AC and DC, single phase, $N=1$):
 1. EUT voltage is set at the APS to 200 V (50 / 60 Hz):
→ DRU can provide 100 A sink current (20 kW) and 82.5 A source current (16.5 kW).
 2. EUT voltage is set at the APS to 125 V (50 / 60 Hz):
→ DRU can provide 100 A sink current (12.5 kW) and 100 A source current (12.5 kW).
→ I_{DRUmax} !
 3. EUT voltage is set at the APS to 240 V (50 / 60 Hz):
→ DRU can provide 83.3 A sink current (20 kW) and 68.8 A source current (16.5 kW).
- B. APS amplifier is configured to an optional/additional AC voltage range (e. g. 480 V AC only, single phase, $I_{EUT} = N * I_{DRU}$):
 1. EUT voltage is set at the APS to 440 V (50 / 60 Hz):
→ DRU voltage is 247.5 V ($N * 440$ V; $N = 270$ V / 480 V) and therefore the DRU can provide 80.8 A_{DRU} / 45.45 A_{EUT} sink current (20 kW) and 66.6 A_{DRU} / 37.5 A_{EUT} source current (16.5 kW).
 2. EUT voltage is set at the APS to 200 V (50 / 60 Hz):
→ DRU voltage is 112.5 V ($N * 200$ V; $N = 270$ V / 480 V) and therefore the DRU can provide 100 A_{DRU} / 56.3 A_{EUT} sink current (11.25 kW) and 100 A_{DRU} / 56.3 A_{EUT} source current (11.25 kW). → I_{DRUmax} !

More detailed information on the DRU series can be found in the [technical datasheet](#).