DRU series

DIGITAL RECUPERATION UNIT
POWER ENHANCEMENT FOR APS AMPLIFIERS

The relating applications:

Recuperation capability for APS power amplifiers

Additional sink and source capability for APS power amplifiers

PHIL simulation systems with APS amplifiers

3-phase digital recuperation unit DM 90000/DRU

- ✓ Sink power extension up to 700 % of the APS sink power capability
- ✓ Source power extension up to 300 % of the APS source power capability
- ✓ Power recuperation efficiency up to 80 %
- ✓ Fast response time - less than 500 µs
- ✓ System combination of DRU and APS with highspeed optical link
- ✓ Automatic control by APS amplifier
- ✓ Integrated webinterface and interface commands

APS AMPLIFIER SOURCE AND SINK ENHANCEMENT

DRU FUNCTIONAL PRINCIPLE AND BENEFITS

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, with respect to its dynamic capabilities and nominal power boundaries. Consequently, the APS provides the remaining current and especially current harmonics with higher frequencies.

The DRU additionally increases the sink and source power capability of the APS amplifier. The maximum continuous sink power with a DRU is up to 7 times higher and the maximum continuous source power is up to 3 times higher compared to APS only.

The DRU is recuperating the sink energy into the mains with an efficiency of about 80 %.

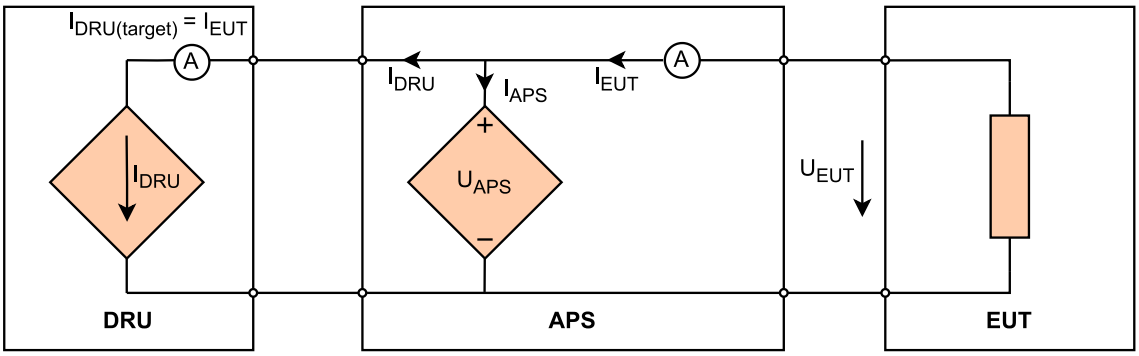

Fig. 1: System configuration with APS and DRU

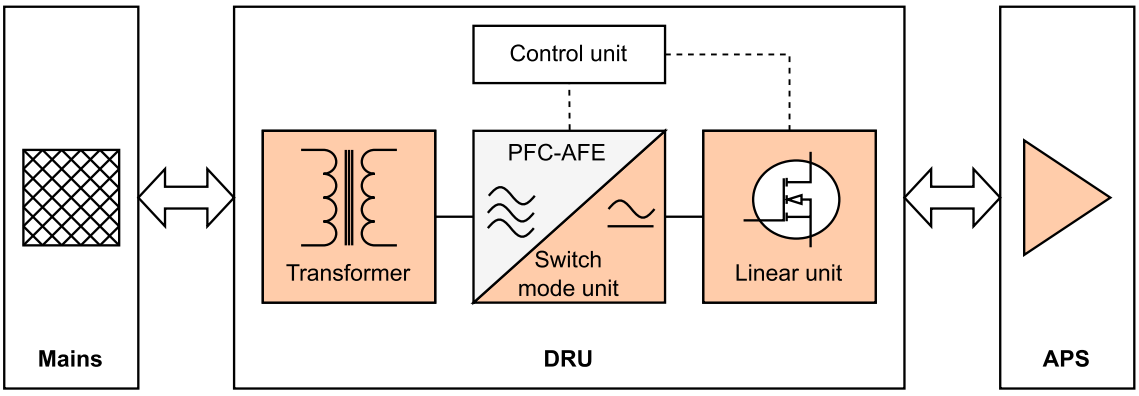

Fig. 2: DRU principle schematic

FEATURES

Potential free connections

The galvanically isolated power connection of the DRU is connected in parallel to the output of the APS. A fibre optic control line connects the DRU control input with the APS and its current and voltage measurement unit.

Automated control signal from the amplifier

The DRU works in automatic mode when connected with the APS.

Excellent signal quality

The DRU extension has negligible impact to the outstanding signal quality of the APS.

Fast response time less than 500 µs

The DRU is a combination of switch-mode and linear elements. The regulation unit is a linear element, necessary to reach the very fast response time.

TOUCHSCREEN USER INTERFACE

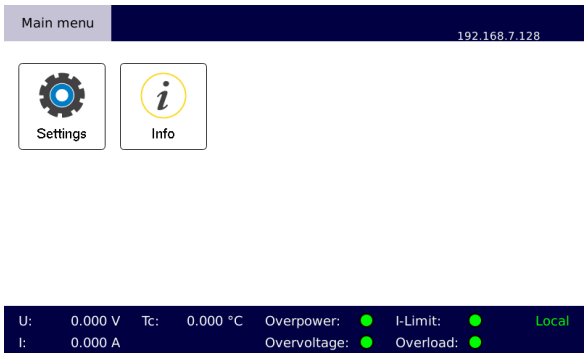

Fig. 3: Main menu

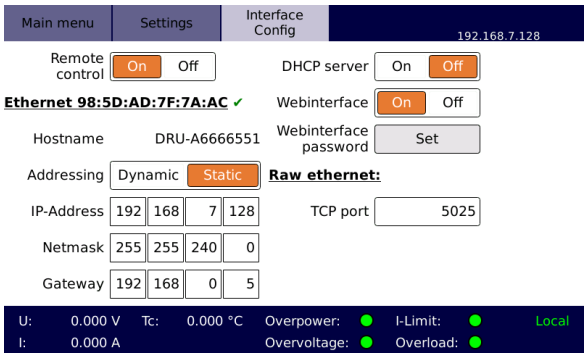

Fig. 4: Interface configuration

SOFTWARE CONTROL

Command interface

- ✓ Easily integrate the device into your own software applications
- ✓ Remote control commands are based on the SCPI standard

Webinterface

- ✓ Monitor and control the connected device via a web browser

TECHNICAL DATA - GENERAL

		DRU series
Sink mode		
	Peak input voltage	500 V
	Max. harmonics	5 kHz
Source mode		
	Peak output voltage	500 V
	Max. harmonics	5 kHz
Large signal bandwidth		DC … 400 Hz
Power factor *(cos φ)*		> 0.95
Protection circuits		overload / short circuit / overtemperature
Internal control unit		
	Display	7.0" touchscreen (17.8 cm, resolution 800 x 480)
	User interface	touchscreen / front panel button / incremental encoder webinterface
Interface		Ethernet 100 Mbit/s (HiSLIP SCPI) USB 2.0 Host
Synchronisation bus		device synchronisation and internal communication optical fibre, LC duplex: - only one ethernet connection required
Insulation resistance		> 1 MΩ
Peak withstand voltage *(max. 10 s, output to earth)*		> 2000 V
Cooling		temperature-controlled forced air cooling
Ambient temperature		+10 °C up to +40 °C
Storage temperature		-25 °C up to +60 °C
Relative humidity		non condensing, max. 80 % for temperature < 31 °C, decreasing linearly to 50 % at 40 °C
Ingress protection		IP20

TECHNICAL DATA – DRU series

		DM 45000/DRU	DM 60000/DRU	DM 90000/DRU
Sink mode				
	Input power continuous	3 x 15 kW	3 x 20 kW	3 x 30 kW
	Input current (RMS)	3 x 75 A	3 x 100 A	3 x 150 A
	Input current (peak and DC)	3 x 110 A	3 x 150 A	3 x 220 A
Source mode				
	Output power continuous	3 x 12 kW	3 x 16.5 kW	3 x 25 kW
	Output current (RMS)	3 x 75 A	3 x 100 A	3 x 150 A
	Output current (peak and DC)	3 x 110 A	3 x 150 A	3 x 220 A
Power supply *(±10 %, 50/60 Hz)*		230 V / 400 V		
Line protection, connection		3 x 100 A, CEE	3 x 100 A, CEE	3 x 150 A, terminal box
Housing		rack, light grey (RAL 7035)		
	Unit approx. dimensions unit (H x W x D)	19", 2 x 42 U 1866 x 1200 x 1050 mm	19", 2 x 42 U 1866 x 1200 x 1050 mm	27", 2 x 42 U 1866 x 1600 x 1050 mm
Weight	*Unit (approx.)*	1400 kg	1400 kg	1600 kg
APS combination *(recommended)*		DM 22500/APS	DM 30000/APS	DM 45000/APS

TECHNICAL DATA – DRU series

		DM 120000/DRU	DM 180000/DRU	DM 270000/DRU
Sink mode				
	Input power continuous	3 x 40 kW	3 x 60 kW	3 x 90 kW
	Input current (RMS)	3 x 200 A	3 x 300 A	3 x 450 A
	Input current (peak and DC)	3 x 300 A	3 x 430 A	3 x 640 A
Source mode				
	Output power continuous	3 x 35 kW	3 x 50 kW	3 x 75 kW
	Output current (RMS)	3 x 200 A	3 x 300 A	3 x 450 A
	Output current (peak and DC)	3 x 300 A	3 x 430 A	3 x 640 A
Power supply *(±10 %, 50/60 Hz)*		230 V / 400 V		
Line protection, connection		3 x 200 A, terminal box	3 x 300 A, terminal box	3 x 440 A, terminal box
Housing		rack, light grey (RAL 7035)		
	Unit approx. dimensions unit (H x W x D)	27", 3 x 42 U 1866 x 2400 x 1050 mm	27", 3 x 46 U 2044 x 2400 x 1050 mm	27", 3 x 46 U 2044 x 2400 x 1050 mm
Weight	*Unit (approx.)*	1800 kg	2500 kg	3000 kg
APS combination *(recommended)*		DM 60000/APS	DM 90000/APS	DM 150000/APS