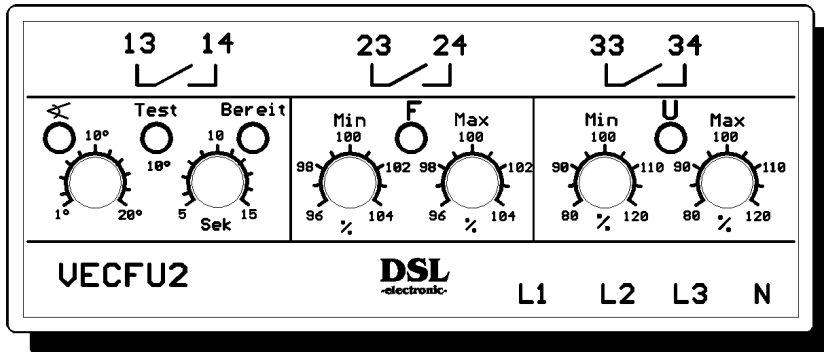


## Mains / Generator Protection Relay VECFU2 (4-wire) ( Phase jumping, Frequency-Monitoring +/-4% and Voltage monitoring )



The mains/generator protection relay VECFU2 is made use of in generator systems for continuous parallel operation with the public supply system for the protection of the generator and for the protection of the mains operator against reverse feeding. The protection relay corresponds to the VDEW Regulations for "self-generating systems" working in a mains-parallel way.

### The mains /generator protection relay VECFU1 contains

- 1 Mains failure relay (vector stepping relay) with 1 potential-free normally open contact with test device integrated in the unit
- 1 One-phase underfrequency and overfrequency relay with 1 potential-free normally open contact frequency-range 50Hz + / - 4%
- 1 Three-phase undervoltage and overvoltage relay with 1 potential-free normally open contact

### Application

Units with synchronous generator are endangered by mains failures during parallel mains or system operation:

- a) A disconnection from the mains is necessary to protect the generator against the (asynchronous) recurring mains voltage at a rapid reclosing (KU = short interruption).
- b) The mains load is to be removed before any overload or short-circuit trip will block the unit just when it is urgently needed as an "emergency power unit".

### Function Test

- a) The unit functions when all four LED's light up with the measuring voltage applied.  
 "Acknowledge key"
- b) Mains failure relay  
 Setting angle to 12 deg. "Test 10 Degrees"  
 Setting angle to 8 deg. No release  
 Release
- c) Voltage and frequency relay: Changing or adjusting the switching point leads to a release.

### Mode of Operation

To enable a synchronous generator to "move" effective power into the mains at parallel mains or supply system operation, the rotor of the generator runs some angular degrees in front of the (phase position) of the mains voltage.

A "spring force" is between the "rigid" mains and the generator rotor.

If the mains now fails to operate, the rotor as well as the generator jumps by some angular degrees (forwards).

This phase shift is typical of a mains outage or failure. It only occurs once and is sensed by the mains/generator protection relay VECFU2 in less than 10 ms.

With a hardly loaded or nonloaded machine, the rotor runs in phase with the mains voltage. If a mains failure should now take place, the rotor cannot "jump". This means that a mains trouble is not recognized. However, the mains/generator protection relay VECFU2 will be tripped in any case at the next load change in the (isolated) mains system.

## Short Interruption

Electricity supply operations frequently make use of the so-called KU circuitry in case of mains troubles. This means that in the case of such a mains interference the affected mains section is isolated via the pertaining protection element, the disturbed point is isolated from the supply energy, an electric arc may distinguish. The mains will then be connected again after the de-ionization time (appr. 200-300 ms). In appr. 80 to 90 % of all incidents, the trouble will be eliminated after this (positive) connection. If the failure still exists, the "sick" mains section will be finally disconnected or isolated. During this separation of the mains system and of the generator, the phase of the voltages go apart. The recurring mains system may encounter the generator in an asynchronous condition. An asynchronous interconnection of mains system and generator can lead to a heavy damage to the generator, clutch and driving machine. In case of a mains trouble, not only the pertaining consumers are connected with the unit, but also whole mains sections up to the point of trouble. This can represent a short-circuit type load for the unit. It is absolutely necessary to instantly disconnect the unit with "its" consumers from the mains system.

## Technical Data

Type	Mains / Generator Protection Relay VECFU2
Construction	Plastic housing on 35 mm hat rail acc. to DIN EN 50022 bzw. DIN 46277
Material of housing	Bayblend FR 1439/0240 modified ABS with burning protection UL 94 VO
Dimensions, Weight	104x68x110mm (BxHxT), ca. 0,4 kg
Rated voltage	231V (L1-N) Other voltages on request
Rated frequency	50 Hz (60 Hz on request)
Release time VEC	10 - 50 ms (faster by adjustment to smaller angle, depends also on figure of phase changing)
Release time F and U	appr. 250 ms (Jump $\Delta F=1\text{Hz}$ , $\Delta U=10\%$ )
Repeat accuracy	+/- 0,5% ( 0 - 60°C )
Power consumption	2,5 VA from L1-N
On period	100 %
Contact rating	5A/250VAC , 5A/30VDC , 0,015 Ohms , $10^5$ switchings
Isolating voltage	3000V (Coil-Contact), 1000V (open contact)
Connecting terminals	Potentialfree, for wire connection up to 2,5 mm <sup>2</sup>
Type of protection	Housing IP 40 , Terminals IP 20 (or VDE 0106T100/VBG4 )
Ambient temperature	-10 °C bis +55°C, 95% Hum
Mains isolating	EN 60 742 (Safety transformers)
General regulations	EN 50 178 (Electrical units in power current installation)
Radio interference	EN 55 022/B
EMV	EN 61000 und EN V 50 140
Installation position	Any
Maintenance	Maintenancefree

## Circuit Diagram

