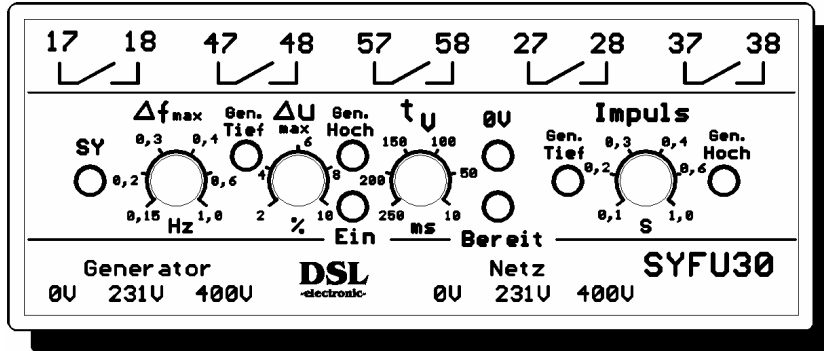


Synchronizing and Frequency Control Unit SYFU30

For fully automatic synchronization, frequency and voltage control
Automatic reverse power protection during synchronization



Application

The SYFU30 is a fully compatible successor unit to the DSL synchronizing units SYFN10 and SYFN20 for use in generators for synchronization with the mains and for the parallel connection of generators. It also includes static frequency and voltage control for the generator. Besides improvements to details in comparison with previous models, an additional display of the voltage difference dU with a setting range dU of 2 – 10% has now been included. The SYFU30 now also includes the additional feature that a synchronizing pulse is only output when the generator is run "Down" (generator frequency higher than mains frequency). This is an example of automatic reverse power protection.

The unit is designed for heavy-duty operation in seriously disturbed networks, for example for USV systems and thyristor controls. This is partly achieved via the low-pass filters integrated into the voltage inputs in the standard version.

Function

The SYFU30 compares the mains voltage with the generator voltage for voltage differences, frequency differences and phase position. The synchronizing relay does not switch through until all "synchronization conditions" have been fulfilled. In addition, various logical operations ensure that synchronizing pulses are not output unintentionally, even in unfavourable circumstances.

Voltage measurement dU causes synchronization to be blocked if the voltage difference set is exceeded. Frequency measurement provides the "Up" and "Down" impulses at the output contacts for adjusting the generator to the setpoint value – a large difference between the frequencies causes a larger number of adjustment impulses to be output in order to accelerate frequency adjustment. At mains failure, an internal quartz generator is connected which provides the high-precision 50Hz reference frequency for off-mains operation of the machine.

If the generator remains suspended between the zero points of the generator and the mains frequency for a longer time, the functional circuit "**acceleration of synchronization**" switches on automatically after 5 seconds and activates the "Up" contact causing the generator to be run up. Here the "Up" contact is output for the duration of the "pulse time" set. If the generator has still not passed zero point after 5 seconds more, another "Up" pulse is output.

The output relay for synchronization is not activated until mains and generator voltage are exactly in phase and various marginal requirements are met such as undervoltage control, differential voltage control, frequency difference control and excess frequency control ($> 3\text{Hz}$) as additional security. The synchronizing pulse is output with the adjustable advance time before the voltages to be synchronized are exactly in phase (0°) in order to compensate for the switching delays of the following power switches. The current frequency difference between the networks is also taken into account here.

Standard Settings

The presettings for differential frequency, differential voltage and pulse duration are made according to the size of the generator and the specifications of the operator. Guiding values:

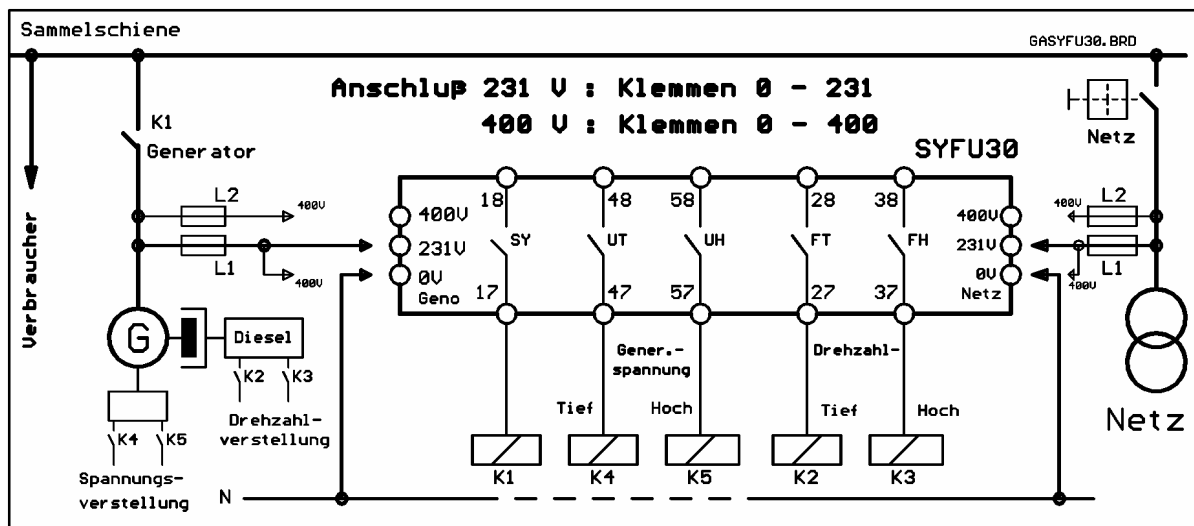
SYFU30 adjuster:	dF	dU	dTv
Small generators	0.6 - 1.0 Hz	5 - 10 %	50 - 80 ms
Medium-sized generators	0.4 - 0.6 Hz	4 - 8 %	80 - 120 ms
Large generators	0.15 - 0.5 Hz	3 - 5 %	80 -ms (specifications of the power switch)

A specific setting must be made for frequency control depending on the characteristic of the mechanical controller. Vibration-free operation is important during fine adjustment.

Technical Data

Type	Synchronizing, Frequency and Voltage Control Unit SYFU30
Construction	Plastic housing on 35mm hat rail as per DIN EN 50022 or DIN 46277
Material of housing	Bayblend FR 1439/0240 modified ABS with burning protection UL 94 VO
Dimensions, Weight	104x68x110mm (WxHxD), appr. 0,4 kg
Rated voltage generator	231V (L1-N) or 400V (L-L) for generator and mains, other values on request
Rated frequency	50 Hz (60 Hz on request)
Power switch delay	10 - 250 ms
Synchronization pulse	200 ms
Accuracy of phase	+/- 2° for frequency difference 0,15 - 0,5 Hz
Repeat accuracy	+/- 0,5% (0 - 60°C)
Power consumption	2,5 VA from generator voltage
Free running (island mode)	50(60) Hz, < 0,1% accuracy (age and thermal)
On period	100 %
Contact ratings	3A/250VAC , 3A/30VDC , 0,03 Ohms , 10 ⁵ Schaltungen
Isolating voltage	2000V (coil-contact), 1000V (open contact)
Connecting terminals	Potentialfree, for wire connections up to 2,5 mm ²
Type of protection	Housing IP 40 , Terminals IP 20 (VDE 0106T100/VBG4)
Ambient temperatures	-10 °C bis +55°C, 95% Hum
Mains isolating acc. to	EN 60 742 (save transformers)
General regulations	EN 50 178 (electrical units in power current installation)
Radio interference	EN 55 022/B
EMV acc. to	EN 61000 und EN V 50 140
Installation position	Any
Maintenance	None

Circuit Diagram



Safety note

The unit must be installed and taken into operation by trained personnel only. It is of particular importance to observe the correct assignment of the mains and generator voltage terminals as well as VDE0160. Incorrect pole assignment can cause considerable damage to equipment and injury to persons. The manufacturer will accept no liability for excessive supply voltages.