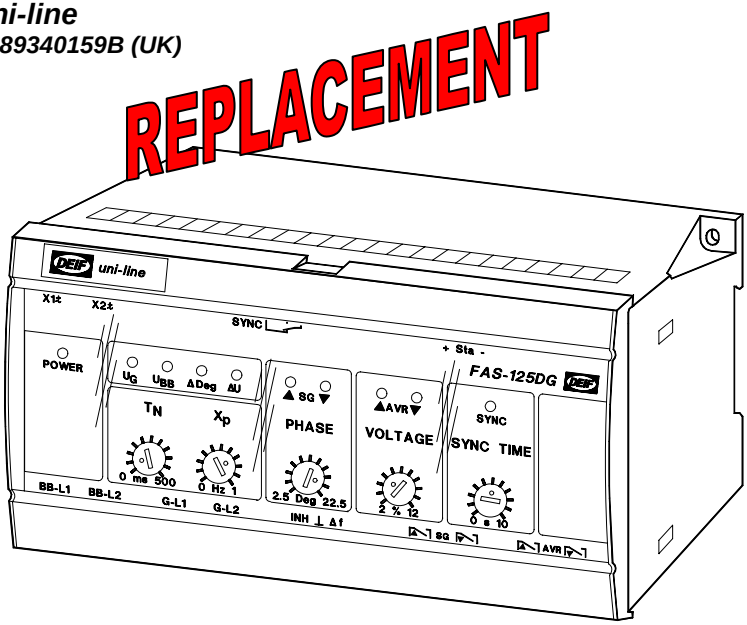
DEIF A/S

Installation and start up instructions

Synchroniser type FAS-125DG

uni-line

4189340159B (UK)



- *Synchronisation of generator to busbar*
- *With voltage matching*
- *Static synchronisation*
- *LED indication of status*
- *LED indication for synchronising signal*
- *35 mm DIN rail or base mounting*

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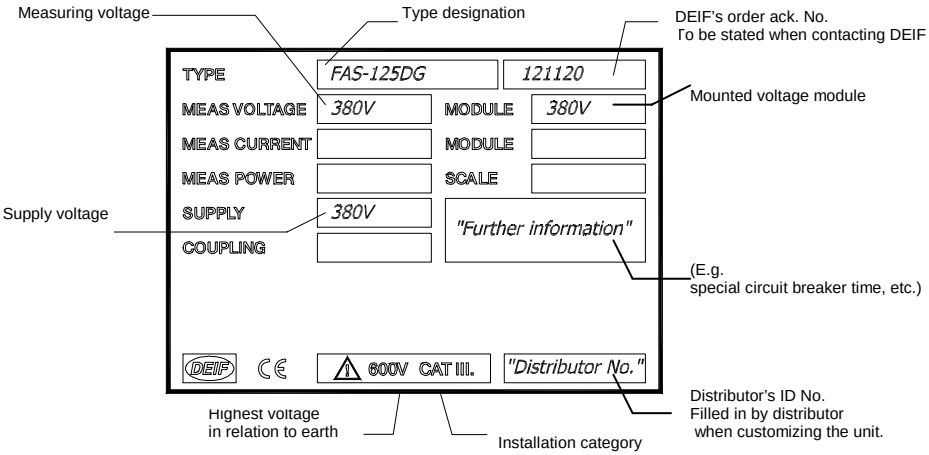
1. Description

This synchroniser with voltage matching type FAS-125DG forms part of a complete DEIF series (the *uni-line*) of relays for protection and control of generators. The FAS-125DG synchroniser measures the busbar and generator voltages and frequencies and compares these, plus compares their phase angles. It controls the generator frequency and voltage, till they match the busbar values. The synchroniser transmits a closing signal for the generator circuit breaker when the phase angle and the voltage difference have been within the limits for a pre-set time. This closing signal stays on as long as the voltage and phase differences are within the limits.

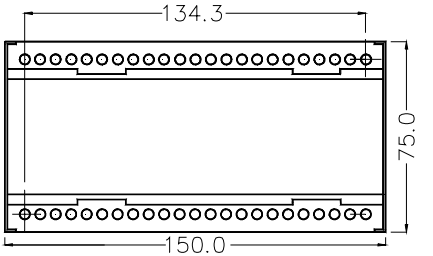
2. Label

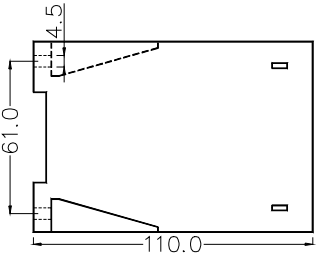
The synchroniser is provided with a label with the following data:



3. Mounting instructions

The FAS-125DG is designed for panel mounting, being mounted on a 35 mm DIN rail, or by means of two 4-mm screws.





Weight:
Approx.
0.750 kg

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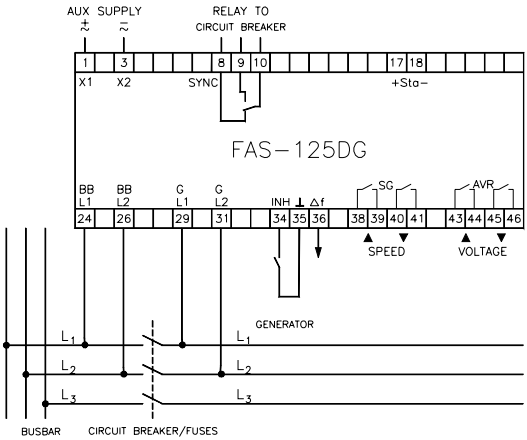
The design of the synchroniser makes mounting of it close to other *uni-line* units possible, however make sure there are min. 50 mm between the top and bottom of this relay and other relays/units. The DIN rail must always be placed horizontally when several relays are mounted on the same rail.

4. Connection diagram



A 2A fuse may protect all voltage inputs.

The synchroniser is protected against ESD (electrostatic electricity), and further special protection against this during the mounting of the unit is not necessary.

The FAS-125DG may be connected between 2 phases or between 1 phase and neutral. The synchroniser is to be configured so that the input of the FAS-125DG corresponds to the connected voltages.

The relay contacts mrk. “SG” (terminals Nos. 38 + 39 and 40 + 41) provide relay signals for increase and decrease of the speed, respectively, and those mrk. ”AVR” (term. Nos. 43 + 44 and 45 + 36) relay signals for increase and decrease of the voltage, respectively. The life of the built-in relays is considerably reduced when connected to inductive loads. Especially for DC controlled pilot/servo-motors, external auxiliary relays should therefore always be mounted. Mounting a “transient suppressor” across the coils of the auxiliary relays is likewise recommended. During start up it is recommended to disconnect the circuit breaker (term. Nos. (8), 9 and 10). By activating the inhibit function (by short-circuiting term. Nos. 34 and 35) all relay outputs (AVR, SG and SYNC) are set to the position “OFF” so no regulation and synchronisation can take place. When the FAS-125DG is applied for simultaneous synchronisation of all generators of a plant to the busbar, the FS line of the load sharing units type LSU… is connected to terminals Nos. 36 and 35.

The unit is equipped with a self-monitoring function. The self-monitoring function supervises the microprocessor and hereby verifies if the programme is running correctly.

	Power LED	**Status output**
Supply voltage not connected or not acceptable.	OFF	OFF
Supply voltage is accepted and the unit is running correctly.	Constant green light	ON
Supply voltage is accepted but the unit is running wrongly.	Flashing green light 2-3Hz	OFF

GL applications only: For applications approved by "Germanischer Lloyd" the status output must be connected to an alarm system. For applications with more than one *uni-line* product the status outputs of the units can be connected in series to the same alarm input. When the units are connected in series the flashing green power LED will indicate the unit that is running wrongly.

5. Start up instructions

5.1 Setting and indication

Setting of		Range
T_N	Control pulse length	25…500 ms
X_p	Proportional band	0…±1.0Hz
Phase	Acceptable phase difference	2.5…22.5°
ΔU_{max}	Acceptable voltage difference	±2…±12% of U_{BB}
SYNC time	Acceptable delay	0…10 sec
LEDs		**Light**
U_G	Generator voltage*	Green, when value is within the acceptable range. Switched off, if outside this range.
U_{BB}	Busbar voltage*	
Δf	Frequency difference*	
ΔU	Voltage difference*	
SYNC	Synchronising	Yellow, when relay is activated.
SG ▲	Increasing speed (frequency)	
SG ▼	Decreasing speed (frequency)	
AVR ▲	Increasing voltage	
AVR ▼	Decreasing voltage	

*) When all 4 LEDs are lit, the conditions for transmission of synchronisation pulses are fulfilled.

The T_N and X_p should be set during the start up. Correct setting of these is of major importance, to ensure a stable control of the generator.

T_N: determines the duration of the control pulse. A short T_N is applied for very swiftly reacting speed governors, a long T_N for slowly reacting speed governors. *Recommended starting point: 0.2 s.*
If the frequency tends to oscillate around the f_{set} value:
- reduce T_N (min. pulse: 25 ms), until stable control is obtained
- then reduce X_p (e.g. to ±0.5Hz), until the control loop becomes unstable again – and select a suitable X_p value between these values (e.g. ±0.75Hz).

X_p: determines the span within which the pulse ratio changes proportionally to the frequency deviation from the f_{set} value. *Recommended starting point: 1.0Hz*.

Phase: is set to the acceptable phase difference between the generator and the busbar (2.5…22.5° electric). If the value is set too low and the generator load varies, synchronisation may not occur. In this case a higher value has to be accepted.

SYNC.: is set to the time that the generator values (phase and voltage) must be within limits, before the synchronisation relay output is activated.

$\Delta U_{max:}$ determines the acceptable difference between the busbar and the generator voltages.
Set to ±2% when synchronising a powerful generator to a stable network
Set to ±12% when synchronising a generator to unstable busbars.

6. Technical specifications

Input voltage:	U_n ±20%. Load: 2kΩ/V
Frequency range:	40…45…65…70Hz
Inhibit input:	Potential-free contact. Open: 5V. Closed: 5mA
Synchronisation output:	1 change-over switch
Frequency control outputs:	2 make contacts
Voltage control outputs:	2 make contacts
Frequency difference output:	1 analog output, -10…0…10V DC corr. to -5…0…5Hz
Contact ratings:	250V-8A-2000A (AC), 24V-8A-200W (DC)
Contact voltage:	Max. 250V (AC). Max 150V (DC)
Galvanic separation:	Between inputs and outputs: 3250V-50Hz-1 min.
Consumption:	(Aux. supply) 3.5VA/2W
Status output:	Open: 10…30V DC Closed: max. 5mA