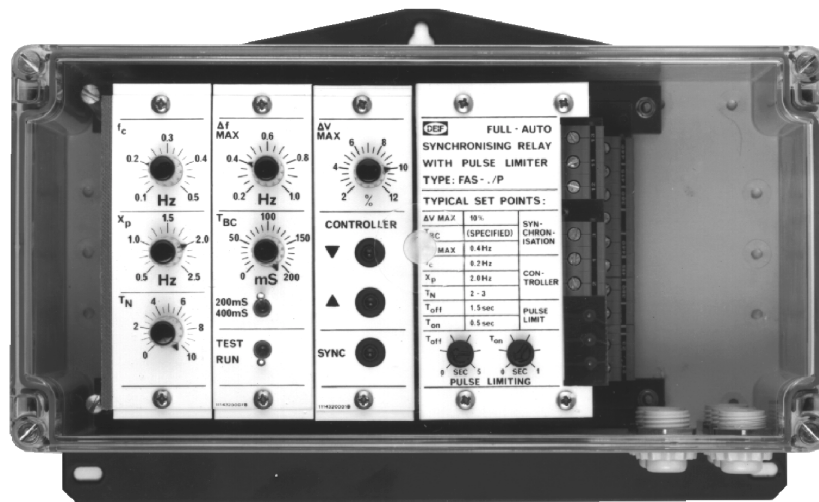


# Synchronising relays with pulse limiter

Types FAS-2N/P, FAS-3N/P

4921250032C



FAS-2N/P

- For water turbine synchronous generators
- Slow and stable control of water supply to turbine
- Low control speed to control the heavy water masses
- 2 adjustable timers for pulse limiting:
  - $T_{ON}$ : 0.1...1 s  $\pm 20\%$  of setting
  - $T_{OFF}$ : 0.5...5 s  $\pm 20\%$  of setting

### Available types

Fully automatic synchronising relay <b>FAS-2N/P</b>	Fully automatic synchronising relay with voltage matching <b>FAS-3NP</b>
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Both types are CE marked for residential, commercial and light industry plus industrial environment.

### General information

If specified by order (using the suffix "/P") the SYNCHROMAT FAS-oN is provided with a pulse limiting unit on delivery, however, standard synchronising relays types FAS-2N and FAS-3N may be fitted with the unit later on.

Condition	Function of FAS-2N and FAS-3N (without pulse limiter)
$f_G$ is lower than $f_{BB}$	Transmits continuous control upwards signal, until $f_G$ is higher than $f_{BB}$
$f_G$ is higher than $f_{BB}$ , but still within $x_p$	Transmits control downwards signal. Duration of pulses depends on frequency deviation
$f_G$ is higher than $f_{BB}$ , exceeding $x_p$	Transmits continuous control downwards signal

Condition	Function of FAS-2N and FAS-3N (with pulse limiter)
$f_G$ is lower than $f_{BB}$	Transmits control upwards signal with constant pulse/pause ratio, determined by the timers $T_{ON}/T_{OFF}$ , until $f_G$ is higher than $f_{BB}$
$f_G$ is higher than $f_{BB}$	Transmits control downwards signal, determined by frequency deviation, however, max. pulse duration is limited by preset $T_{ON}$ time.

### Abbreviations:

$f_G$ : generator frequency     $f_{BB}$ : busbar frequency     $x_p$ : proportional band

### Adjustments

1.	Set all knobs to the values stated on the front of the unit.
2.	Set the "TEST/RUN" switch to the "TEST" position.
3.	Connect the synchronising relay (SYNCHROMAT).
4.	Run up the generator manually to approx. 5Hz overfrequency.
5.	<p>a. If the generator automatically is controlled quickly to a frequency lower than the busbar frequency: Reduce <math>T_{ON}</math> by 0.1 s and repeat item 4.</p> <p>b. If the generator automatically is controlled slowly towards the set point (<math>f_c</math>): Increase <math>T_{ON}</math> by 0.1 s and repeat item 4.</p>
6.	Run down the generator manually to approx. 5H underfrequency.
7.	<p>a. If the generator automatically is controlled to a frequency approx. 2Hz higher than the busbar frequency: Increase <math>T_{OFF}</math> by 0.2 s and repeat item 6.</p> <p>b. If the generator automatically is controlled slowly and to a frequency only slightly higher than the busbar frequency: Reduce <math>T_{OFF}</math> by 0.2 s and repeat item 6.</p>
8.	<p>If a stable frequency control is not achieved by this:</p> <p>a. Increase <math>x_p</math> to 2.5Hz</p> <p>b. Reduce <math>T_N</math> to 1.</p> <p>Check that the regulating mechanism moves at the briefest control pulses. If necessary, adjust the hydraulic valves to a smaller dosing.</p>
9.	If normal generator voltage is achieved at a very low generator frequency, the control upwards to normal frequency may take a very long time. If so, feeding the regulating mechanism a continuous control upwards signal from a separate frequency relay is recommended, until the generator frequency reaches a value approx. 5Hz lower than the busbar frequency.
<b>Note</b>	<p><math>T_{OFF}</math> timer is only active when the generator is controlled upwards.</p> <p><math>T_{ON}</math> timer determines the total length of the "pulse" during control upwards.</p> <p><math>T_{ON}</math> timer limits the maximum length of the "pulse" during control downwards.</p>

**Further information:** See data sheet No. 4921250029 **Synchronising relays, FAS-2N, FAS-3N**, regarding specifications, connections, etc.

Due to our continuous development we reserve the right to supply equipment which may vary from the described.



DEIF A/S, Frisenborgvej 33  
DK-7800 Skive, Denmark

Tel.: +45 9614 9614, Fax: +45 9614 9615  
E-mail: deif@deif.com, URL: www.deif.com

