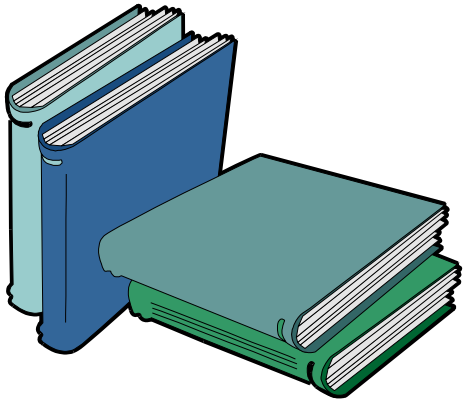
INSTRUCTION & OPERATION

SELCO



T5000 Synchrocheck relay (paralling relay)

- **Installation & wiring**
- **Application**
- **Function**
- **Automatic closure**

Installation & wiring

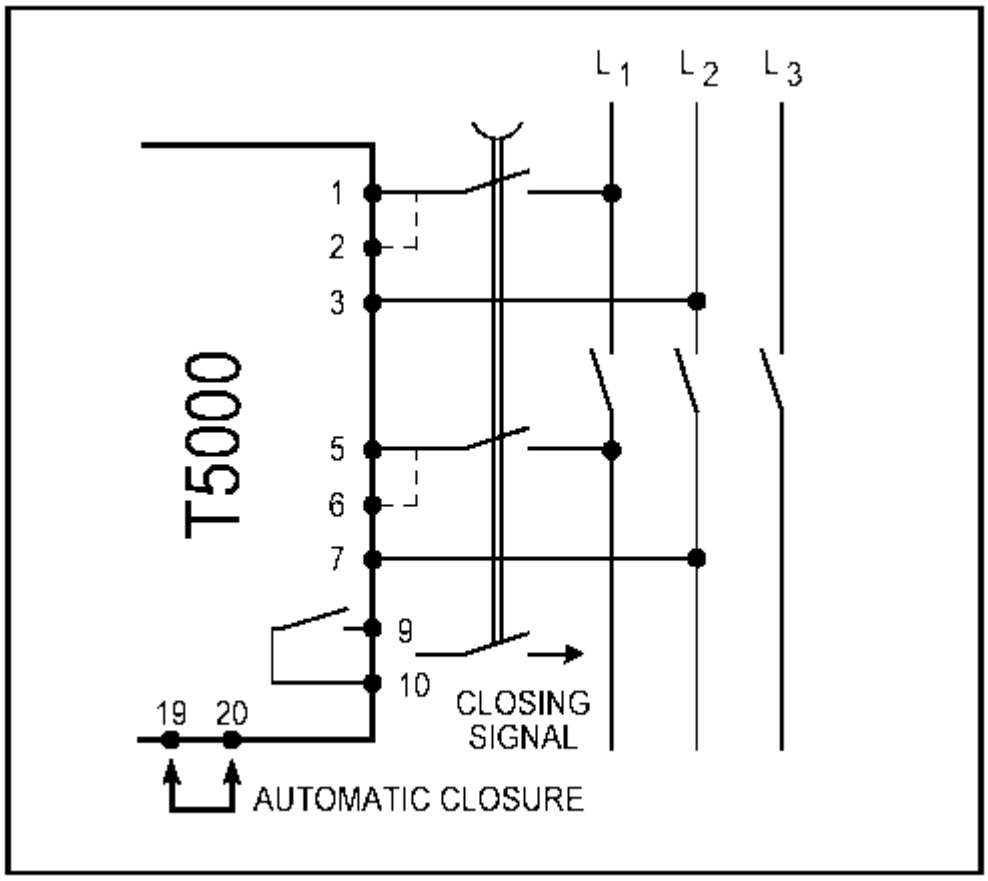


Fig. 1. Connection Diagram.

Installation
35 DIN rail or two 4mm (3/16")screws

Input
The two supplies should be connected to terminals 1-3 /5-7 or 2-3 /6-7 according to the voltage (see Fig.1. connection diagram).
Both supplies should remain disconnected until the function of the unit is needed, as shown in the connection diagram of the unit .
Be careful that correct terminals are connected.
Internal PT would be burned if your connect 1-2 or 5-6.

Adjustment
An adjustoment ΔΦvoltage ±10%is normally recommended,
but for small high speed engines a setting of up to ±15% can be used.
The ±15% setting will give a faster synchronization than the ±10%setting.

Synchro output relay
When commissioning,it is recommended to disconnect the closing signal (terminals 9 or 10).
Check that the red LED “RELAY ” indicates the closing signal,, when the two systems (generator and busbar)are in phase accordance.
If this happens in 180 ° phase displacement, the wires to terminals 1 or 2 and 3 must be interchanged.

Application

Synchronizing check relay, also known as paralling relay is mainly used to ensure that two AC supplies are synchronized. For a system to be synchronized, voltage, phase angle and frequency have to be within predefined limits.
T5000 can monitor either mains bus bar and incoming generator, or two generators
The T5000 is a part of the SELCO T-Line series with modular units for protection, control and monitoring of generators, both in marine and land-based applications.The T5000 is type approved by major marine classification societies.

Generator to Bus

The T5000 Relay can be used as a check synchronizer,inhibiting closure of circuit breaker if synchronizing parameters such as voltage, frequency and phase angle are outside limits,thus preventing generator damage and disturbance to the busbar.
The T5000 can also be used as synchronizing aid for manual or automatic synchronization where voltage and frequency are adjusted by the operator to roughly the values required,and the unit will provide a closing signal to the circuit breaker at phase accordance.

Function

Synchroout relay

A built-in relay will close when voltage, frequency and phase are within limits. The relay output can be connected in series with a manually operated contact to operate the circuit breaker between the 2 systems,e.g.a generator to a busbar.
The output relay is activated all the time during phase ccordance. However,the T5000 will always give an output pulse with a minimum duration of 0.5 seconds, meaning there will be enough time for the circuit breaker to close.

voltage adjustment (ΔU,scale 10-15%)

It is provided on the front of the unit for combined adjustments of limits for voltage difference,frequency difference and phase difference.These limits are internally related to obtain optimal and safe operational performance.

ΔΦ & ΔF on minimum ΔU ±10% position

With the scale adjusted to the minimum position,the voltage difference (ΔU) is ±10%. This corresponds to a phase difference (ΔΦ)of ±6 ° and a frequency difference ΔF) of ±0.15Hz.These numbers are internally inverse related in such a way that a larger voltage difference (ΔU), will allow only reduced phase difference (ΔΦ) and frequency difference (ΔF).

ΔΦ & ΔF on maximum ΔU ±15% position

With the scale adjusted to the maximum position,the voltage difference (ΔU) is ±15%. This corresponds to a phase difference (ΔΦ)of ±9 ° and a frequency difference (ΔF) of ±0.225Hz.As above, these numbers are internally inverse related.

LED

A red LED marked “RELAY ” on the front of the unit indicates that the output relay is activated.

Automatic closure

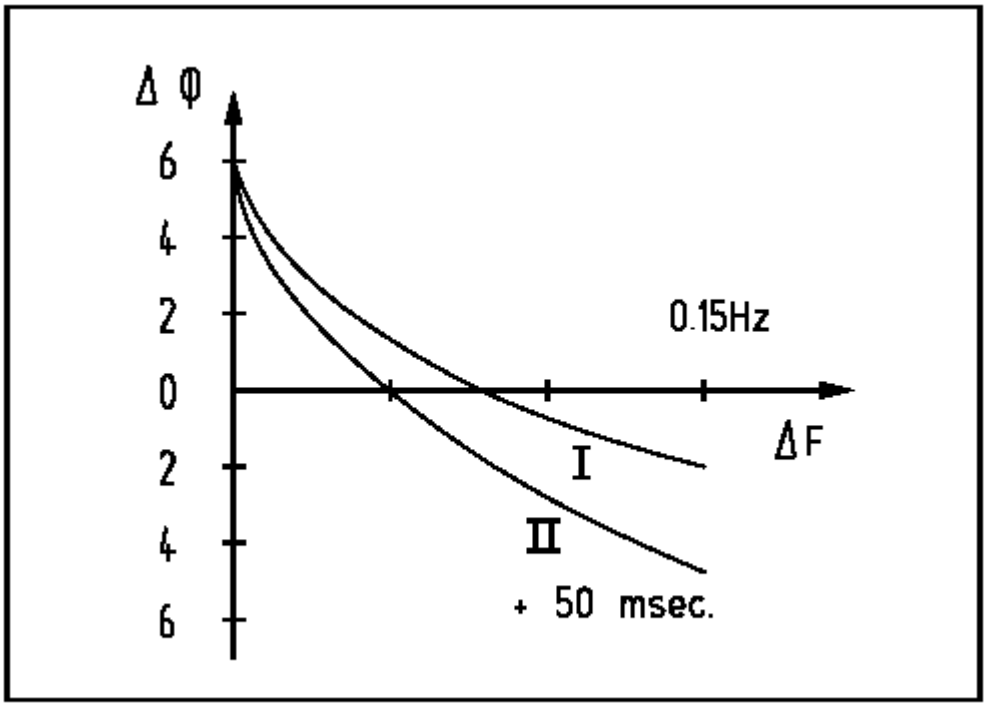


Fig. 2. Automatic Closure.

In order to use the T5000 with automatic closure ,terminals 19 and 20 should be interconnected,and the T5000 will now operate as illustrated in fig.2.
This figure shows the closing phase difference (ΔΦ) as a function of frequency difference (ΔF), assuming that there is no voltage difference present and that th (ΔV) voltage setting is ±10%.
For a very smal ΔF, it is seen that the ΔΦ is 6 °.
For higher values ΔF, the ΔΦ will vary as shown.
The line I shows the closing signal directly from the T5000.
The line II shows the main contact closure with an additional circuit breaker operation time of 50 msec.
At a low ΔF,the phase difference will change very slowly and the additional 50 msec. have almost no effect on the difference between the two curves. At a higher ΔF, the phase differencewill change faster,and thus the difference between the two curves becomes larger. However,the curves also show that the phase difference at breaker closure will not exceed ± 6 °, provided the circuit breaker is a fast operating type (operating time 50 msec.or less).