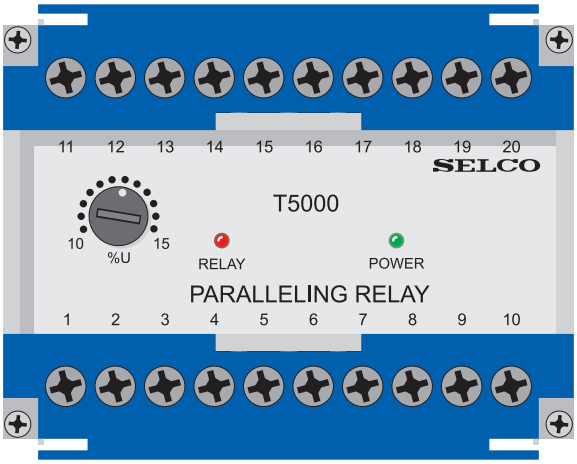
T5000 Paralleling Relay

- Check synchronizer for enabling closure of circuit breakers
- Specially designed for automatic closing of fast circuit breakers
- Visual indication of voltage and closing signal
- Output signal minimum 0.5 seconds duration for automatic closure
- Cost effective and highly reliable compact design
- 50 hours burn-in before final test
- Operating temperature range: -20°C to +70°C
- Certified by major classification societies
- Flame retardant enclosure



Application

The T5000 Paralleling 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.

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.

Function

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.

A D voltage adjustment (DU, scale 10-15%) 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.

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

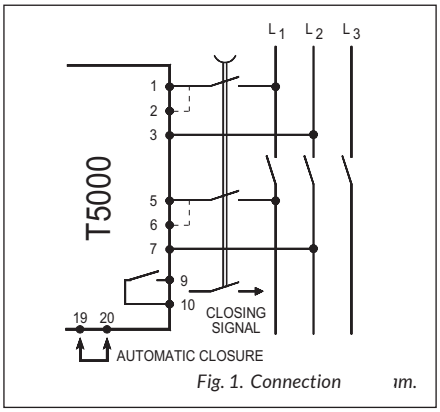


Fig. 1. Connection ım.

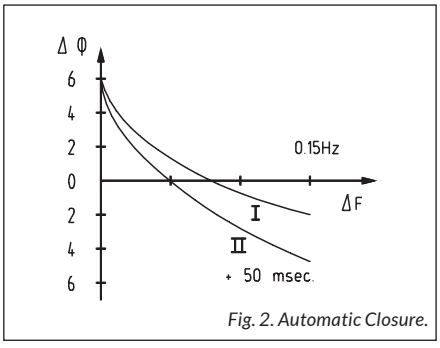


Fig. 2. Automatic Closure.

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

A red LED marked "RELAY" on the front of the unit indicates that the output relay is activated.
The output relay is activated all the time during phase accordance. 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.

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 (Df) as a function of frequency difference (DF), assuming that there is no voltage difference present and that the D voltage setting is ±10%.

For a very small DF it is seen that the D f is 6°. For higher values of DF, the D f 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 DF, 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 DF, the phase difference will 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).

Specifications

T5000 Paralleling Relay

Max. voltage	660V
Voltage range	70 - 110%
Consumption	2 x 5VA max.
Frequency range	45 - 65Hz
Voltage difference	10 - 15%
Frequency difference	0.15 - 0.225Hz Combined setting
Phase difference	6 - 9°
Contact rating	AC: 400V, 5A, 1250VA DC: 150V, 5A, 120W
Operating temperature	-20°C to +70°C
Dielectric test	2500V, 50Hz
EMC	According to IEC/EN 61000-6-1/2/3/4
Approvals	Certified by major marine classification societies
Burn-in	50 hours before final test
Enclosure material	Polycarbonate, flame retardant
Weight	0.7kg
Dimensions	70 x 100 x 115mm (H x W x D)
Installation	35 DIN rail or two 4mm (3/16") screws

The specifications are subject to change without notice.

Type Selection Table

Type	Terminals 1-3 5-7	Terminals 2-3 6-7	Function
T5000.0010	450V	400V	
T5000.0020	230V		
T5000.0030	480V	415V	
T5000.0040	110V	100V	
T5000.0050	127V	120V	
T5000.0060	480V	415V	Df = 9 - 13.5°, DF = 0.2 - 0.3Hz
T5000.0070	450V	400V	DU = 15 - 20%, Df = 9 - 13.5°, DF = 0.2 - 0.3Hz
T5000.0080	110V	100V	DU = 15 - 20%, Df = 9 - 13.5°, DF = 0.2 - 0.3Hz
T5000.0090	450V	400V	Df = 9 - 13.5°, DF = 0.2 - 0.3Hz
T5000.0100	660V		

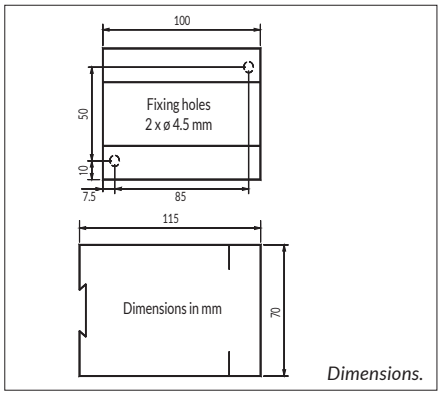
Other supply voltages and functions are available on request.

Installation

The two supplies should be connected to terminals 1-3 / 5-7 or 2-3 / 6-7 according to the voltage (see conn. diagram).
Both supplies should remain disconnected until the function of the unit is needed, as shown in the connection diagram.
An adjustment of D voltage ±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.

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.



Dimensions.

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