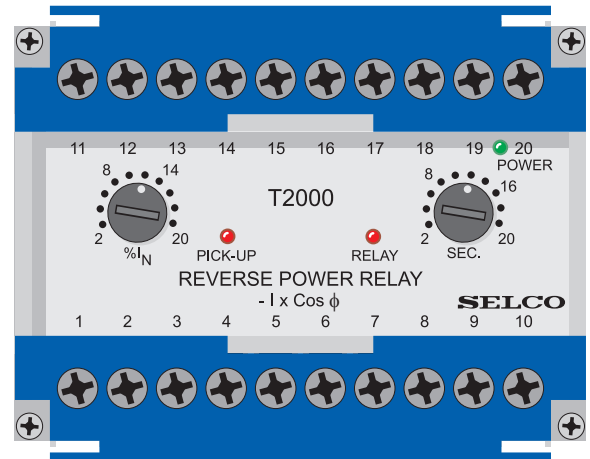


T2000 Reverse Power Relay



- Protection of generator prime movers against reverse power
- Visual indication of power, pick-up and relay tripping
- High precision digital countdown timer for delayed output
- Direct Line-Line supply where neutral is not available
- Accepts high supply voltage variations: 50 - 110%
- Cost effective and highly reliable compact design
- 50 hours burn-in before final test
- Certified by major marine classification societies
- Flame retardant enclosure



Application

The T2000 Reverse Power Relay will under parallel operation prevent the generator from running as a motor, thus protecting the prime mover (e.g. a diesel engine) by tripping the generator breaker, and at the same time avoiding overload on the remaining generators with a possible blackout of the system.

Together with the T2100 Excitation Loss Relay, the T2500 Overcurrent and Short Circuit Relay and the T2700 Power Relay, the T2000 provides the optimal solution for complete generator protection, both in marine and land-based applications. The T2000 is type approved by major marine classification societies.

Function

The T2000 measures the voltage across phases L1 and L2 (or between L1 and neutral for L-N operation) and the current through a current transducer attached on phase L1.

The T2000 calculates $I \times \cos \phi$, representing the active power. If the active power becomes negative and exceeds the preset level (2 - 20%), the pick-up LED will indicate and the delay timer will be started.

After the preset time (2 - 20 sec.) has expired, the output relay and LED will be activated, provided that the reverse power level was exceeded for the entire delay time.

The output relay is a latching relay. The latching can be reset or disabled by bridging terminals 13 and 14.

Installation

Typical setting of reverse power: For diesel engines 8%, delay 10 sec. and for turbines 4%, delay 10 sec.

Example of setting:

Required trip level: 8%
 Generator rating: 714A at PF = 0.8
 $I_p \text{ max: } 714 \times 0.8 = 571\text{A}$
 Current transformer: 800/5A
 Setting: $8 \times 571/800 = 5.7\%$

It is important that the phase where the current is measured is always connected to terminals 1 or 2. See connection diagram.

For L-L operation terminal 3 is connected to the next phase in the phase sequence. For L-N operation terminal 3 is connected to neutral.

It is important that the phase sequence is correct and the current transformer side

nearest the generator side is connected to terminal 5.

The LED based pick-up indication is ideal for testing. The T2000 can be tested by reducing the speed on the generator, until the pick-up LED indicates exceeding the preset reverse power level.

Troubleshooting

1) If the relay operates on forward load, the wiring to terminals 5 and 6 are interchanged.

2) If the relay is not operating in any power direction and there is voltage on terminals 1 and 3 or terminals 2 and 3, check that current is floating in the current circuit terminals 5 and 6.

3) If the relay trips are at different levels when the tests are repeated, check that the voltage and current inputs have the correct phase relationship and that the phase sequence is correct.

4) If the relay trips in situations with high motor loads, check (as in 3) that the voltage and current inputs have the correct phase relationship and that the phase sequence is correct.

Specifications

T2000 Reverse Power Relay

| | |
|-----------------------|--|
| Trip level | 2 - 20% I_N |
| Delay | 2 - 20 sec. |
| Max. voltage | 660V |
| Voltage range | 50 - 110% |
| Consumption | Voltage 5VA at U_N Current 0.3VA at I_N |
| Continuous current | $2 \times I_N$ |
| Frequency range | 45 - 400Hz |
| Output relay | Normally de-energized, latching, resettable |
| Contact rating | AC: 400V, 5A, 1250VA DC: 150V, 5A, 120W |
| Overall accuracy | $\pm 5\%$ |
| Repeatability | $\pm 1\%$ |
| 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 | 0.5kg |
| Dimensions | 70 x 100 x 115mm (H x W x D) |
| Installation | 35mm DIN rail or 4mm (3/16") screws |

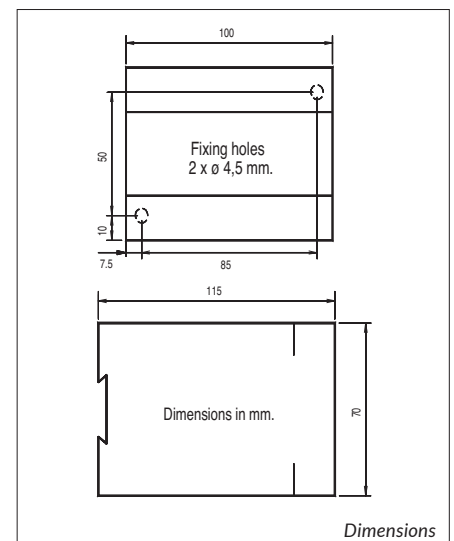
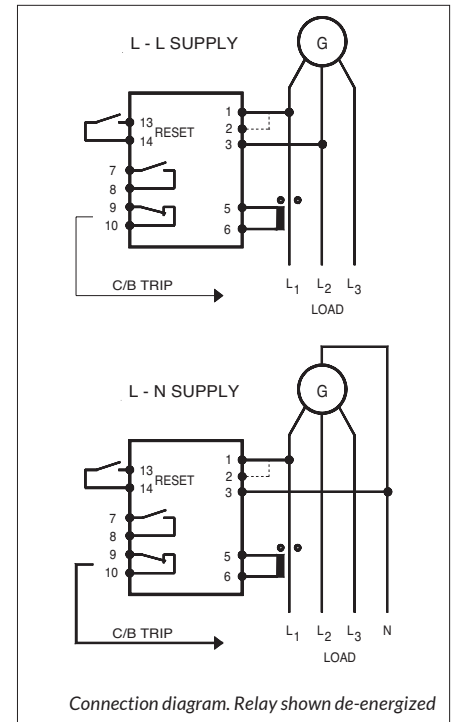
The specifications are subject to change without notice.

Type Selection Table

Standard types: $I_N = 5A$

| Type | Terminals | | I_N | Supply | Function |
|------------|-----------|------|-------|--------|----------------------|
| | 1-3 | 2-3 | | | |
| T2000.0010 | 230V | | 5A | L-N | |
| T2000.0020 | 450V | 400V | 5A | L-L | |
| T2000.0030 | 127V | 120V | 5A | L-N | |
| T2000.0040 | 110V | 100V | 5A | L-L | |
| T2000.0050 | 110V | 100V | 5A | L-L | No time delay |
| T2000.0060 | 230V | | 1A | L-N | |
| T2000.0070 | 660V | | 5A | L-L | |
| T2000.0080 | 450V | 400V | 5A | L-N | Delay 0.2 - 2.0 sec. |
| T2000.0090 | 127V | 120V | 5A | L-L | |
| T2000.0100 | 110V | 100V | 1A | L-L | |
| T2000.0110 | 450V | 400V | 5A | L-L | No time delay |
| T2000.0120 | 480V | 415V | 5A | L-L | |
| T2000.0130 | 230V | | 5A | L-N | No time delay |
| T2000.0140 | 230V | | 5A | L-L | |
| T2000.0150 | 480V | 415V | 1A | L-L | |
| T2000.0160 | 450V | 400V | 1A | L-L | |

Other supply voltages and combinations are available on request.



Approvals & Certificates

The T2000 has been approved by major marine classification societies.

For more information about the individual certificates, please visit selco.com