Active Trigger Units For Thyristors

The ATU - (Active Trigger Unit) economically replaces conventional pulse transformers including all associated circuitry. It can be directly connected to the outputs of microcontrollers, microprocessors, CPLD’s and FPGA’s. It derives its power from the anode of the thyristor and requires 12mA control signal for triggering any size of thyristor. It triggers the devices under all possible load conditions. The small size and the possibility of using long gate leads makes this the ideal component for compact highly flexible designs. Each ATU triggers 2 thyristors and is intended for mains voltages ranging from 200Vrms to 690Vrms

SPECIFICATION

AS400 - SERIES - designed for all possible applications e.g. controlled rectifiers, voltage controllers
AS401 - SERIES - designed for economic AC controllers
AS402 - SERIES - designed for AC controllers requiring zero crossing switching

Peak Thyristor voltage > 2000V (1200V & 2400V upon request)
Maximum AC voltage < 750Vrms continuous
Gate trigger current > 1.2A with 2A/us at 400V anode voltage (2A upon request)
Control current < 12mA into an optocoupler
Input reverse voltage < 6V
Turn on delay < 20µs at 12mA control current
Input – Output insulation > 800V peak continuous – 6KV 10s – according to VDE 0884
Temperature Range -25°C to +85°C ambient

ATU - TYPE AS400 -

CONNECTION DIAGRAM FOR A CONTROLLED RECTIFIER

DIMENSIONS
Height = 18mm
PCB Hole Size = 0.8mm
Color = Black

ATU - TYPE AS401 - & AS402 -

CONNECTION DIAGRAM FOR AC VOLTAGE CONTROLLER OR ZERO-CROSSING SWITCH

DIMENSIONS
Height = 22.5mm
PCB Hole Size = 0.8mm
Color = Blue (AS401…), Green (AS402…)
APPLICATION INFORMATION

The ATU uses the anode voltage of the thyristor as a supply for the gate trigger current. Therefore no power supply is needed for generating the trigger pulses. As long as there is a control current flowing into the control terminals of the ATU, the thyristor remains triggered. This is a useful feature when the thyristor is required to control highly inductive loads. It is recommended that a continuous pulse instead of a train of pulses is used. The unit can also trigger amplifying gate thyristors.

Because the anode voltage of the thyristor supplies the power for the trigger pulses, the anode to cathode voltage applied to the thyristor must be greater than the onset voltage of about 12V before a trigger current can be produced. The trigger current increases with the anode voltage until it reaches its maximum of 1.2A at about 25V. This onset voltage is small and can be ignored for sinusoidal mains operation.

Upon application of the control current the thyristor receives a fast rising gate current which is fully maintained until the anode voltage of the thyristor collapses. This kind of operation accounts for the low power dissipation of the ATU. On the other hand, if the gate – cathode terminals are short circuited during operation, the trigger unit can be destroyed due to excessive power dissipation.

The gate of the thyristor is current driven from a voltage source of 30V. This eliminates the need for very short gate leads. Twisted gate leads in the order of 1m can be used, even in very hostile environments.

The typical control current is less than 6mA. In order to accommodate the aging effect of the opto-coupler and its temperature dependence, it is good engineering practice to drive the unit with 12mA. The input of the ATU consists of the light emitting diode of the optocoupler.