AC..CS

SAFETY WIREWOUND RESISTOR

A WORLD OF SOLUTIONS

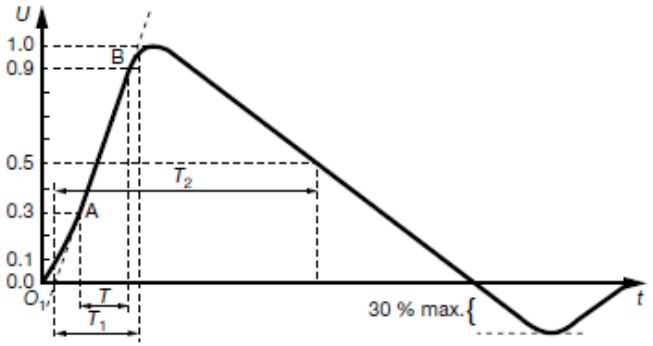
INTRODUCTION

- Purpose
  - Overview of the AC03..CS and AC05..CS fusible wirewound safety resistors
- Objectives
  - Present an overview of this product's special electrical parameters
  - Discuss product features
  - Discuss product advantages

This presentation provides an overview of the AC03..CS and AC05..CS fusible wirewound safety resistor series. The electrical parameters of the safety resistor series will be shown in the upcoming slides as well as features, benefits, and applications..

MAIN FEATURES OF THE AC..CS

- UL1412 recognized fusible wirewound resistor; UL file no. E362452
- Surge voltage capability as per 1.2/50us pulse in IEC 61000-4-5:
  - For AC03..CS: 2 kV (4.7 Ω to 91 Ω) and 4 kV (100 Ω)
  - For AC05..CS: 4 kV (10 Ω to 20 Ω) and 6 kV (22Ω to 100 Ω)
- Fusing time:
  - For AC03..CS: < 25 s for 45 W overload
  - For AC05..CS: < 45 s for 100 W overload
- Ohmic range:
  - For AC03..CS: 4.7 Ω to 100 Ω, 5 %
  - For AC05..CS: 10 Ω to 100 Ω, 5 %
- Non-flammable silicone cement coating for immediate interruption without flame and explosion when mains voltage (230 VAC) is applied



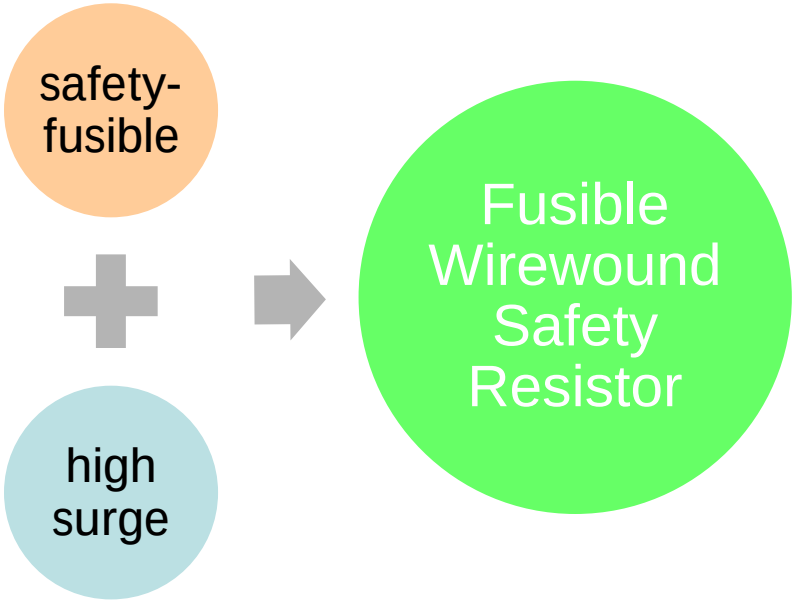
Front time: T1 = 1.67 x T = 1.2 µs ± 30 %
Time to half-value: T2 = 50 µs ± 20 %

Waveform of open-circuit voltage (1.2 µs/50 µs) at the output of pulse generator

Encapsulated by a special lacquer that exhibits superior safety fusing, the Vishay AC..CS series is UL1412 recognized. Additionally, the 3W (AC03..CS) and 5W (AC05..CS) safety wirewound resistors exhibit pulse handling capabilities up to 4kV and 6kV respectively. The AC03.CS series is offered from 4.7Ω to 100Ω while the AC05..CS series is offered from 10Ω to 100Ω.

COMPETITIVE BENEFITS

- The AC..CS is a dual resistor

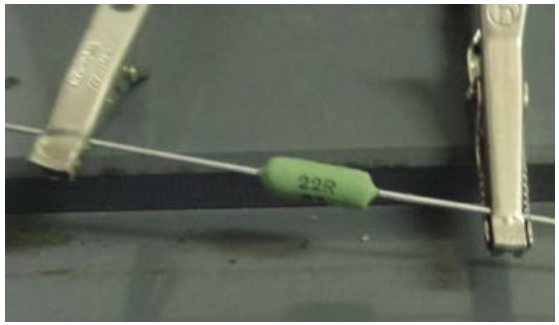


AC..CS components use specially selected resistive winding wire and a special nonflammable silicone cement coating material to ensure safe and silent fusing operation in overload conditions. This allows components from the series to be used as fusible safety resistors (or AC mains voltage input resistors). Under normal operation these resistors act as an in-rush current limiting resistor with a surge capability of up to 4 kV for the AC03..CS or 6 kV for the AC05..CS. Additionally, resistors from this series fuse “without a bang” when an AC mains voltage 115 VAC or 230 VAC is applied. This means that AC..CS components can be used to meet the requirements of safety approval while eliminating the need for additional fuses in series with a standard input resistor.

FUSING OPERATION

- Safe and silent fusing operation in overload conditions

- Fusible resistor offered by competitors fuses with spark and explosion

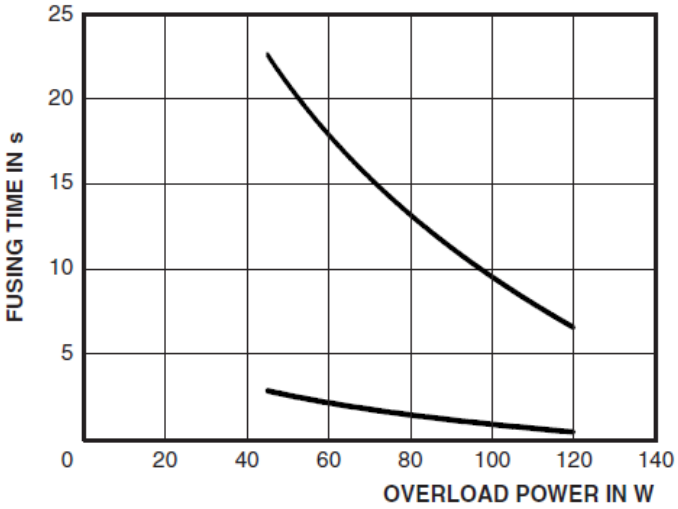


- Vishay AC..CS safety resistor fuses silently without spark or explosion

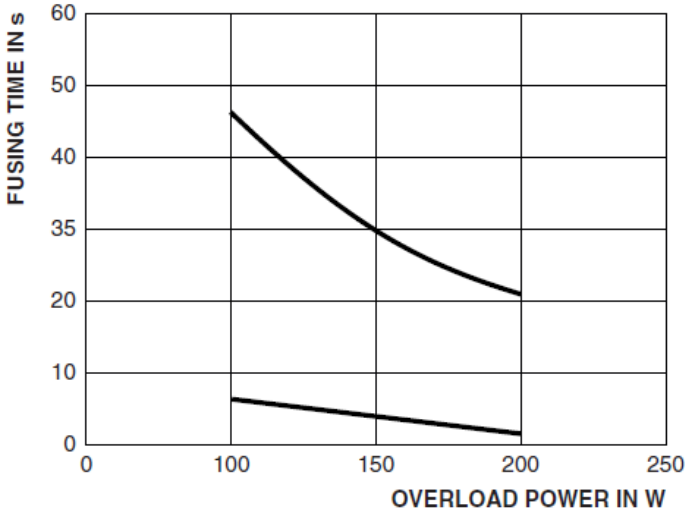
The special non-flammable silicone cement coating utilized in the construction of the AC..CS helps to prevent a flame or explosion from occurring when an AC mains voltage 115 VAC or 230 VAC is applied. To compare, fusible resistors offered by competitors produce heavy and visible sparks under similar overload conditions. In addition to being nonflammable, the specially developed lacquer coating meets the excellent thermal and electrical insulating properties of standard silicone cement coatings.

FUSING CHARACTERISTICS

- The AC..CS has well-defined fusing characteristics when exposed to overload



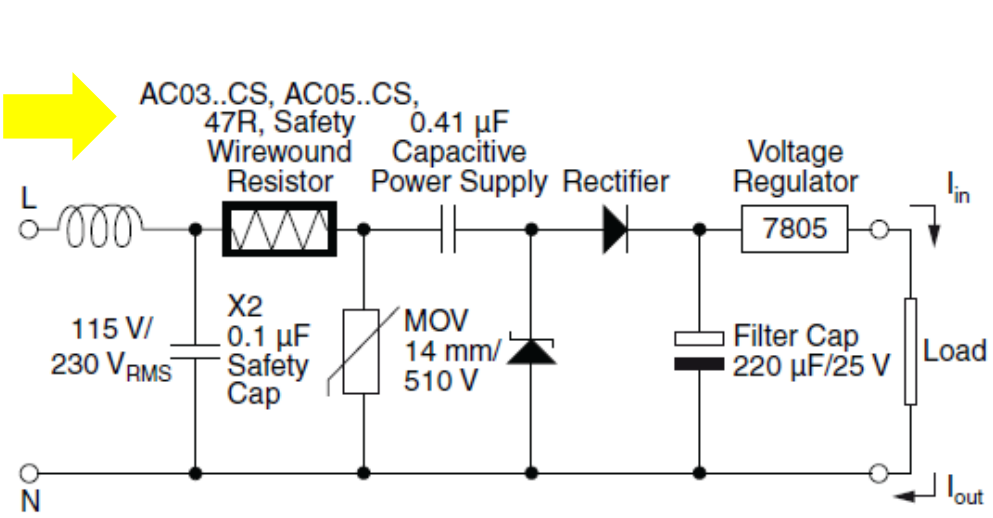
FUSING CHARACTERISTICS
OF AC03..CS: 4.7 Ω ≤ R ≤ 100 Ω

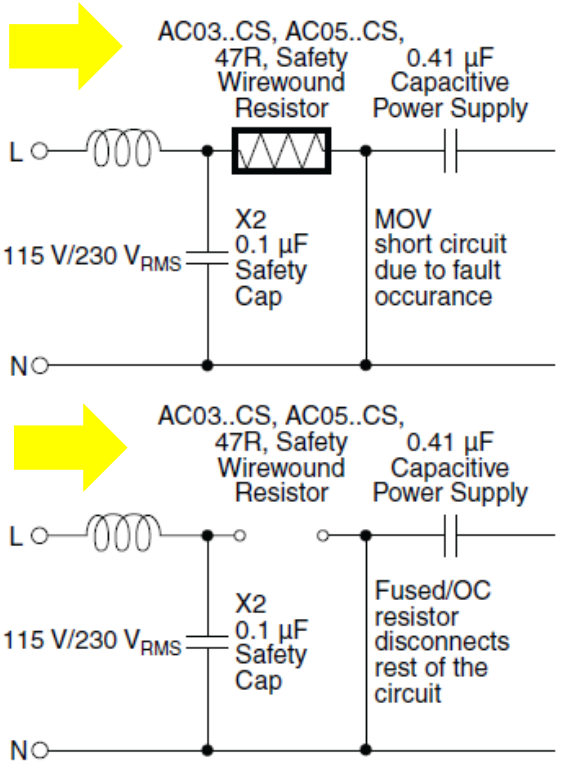


FUSING CHARACTERISTICS
OF AC05..CS: 10 Ω ≤ R ≤ 100 Ω

The AC..CS resistor series is designed with specially selected resistive wire and multilayer coating allowing for well-defined fusing behavior when exposed to overload power. For example, the AC03..CS series has a fusing time of less than 25s when exposed to a 45W overload condition while the AC05..CS series has a fusing time of less than 45s when exposed to a 100W overload condition.

INRUSH CURRENT CONTROL





In the schematic shown above (on the left), the AC..CS safety resistor is being used to limit inrush current. The ohmic value should be carefully chosen to avoid dissipating too much power while being large enough to limit inrush current. When the MOV is short-circuited during a fault condition (as shown in the top right image), the mains voltage 115 VAC or 230 VAC appears across the safety resistor, drawing a high current and eventually fusing the resistor. This creates an open circuit (as shown in the bottom right image). In this design, the resistor helps to protect the other circuit sections during a voltage surge, all without creating a flame, spark or explosion.

APPLICATIONS

Alternative Energy

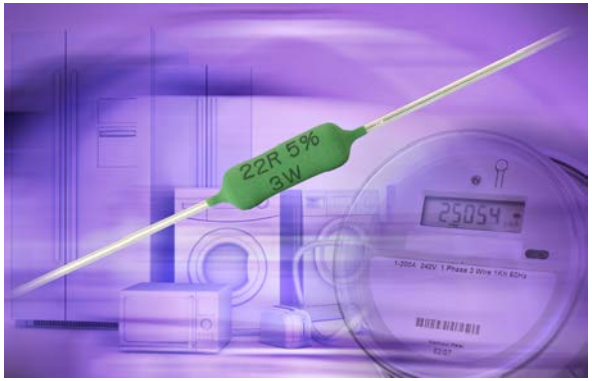
- Power Meter
- Smart Grid Solutions

Consumer

- Domestic Appliances
  - Washing Machine
  - Dishwasher
- Battery Chargers

Industrial

- Arc Fault Breaker
- Fire Control Systems
- Power Supply



These wirewound resistor series were especially designed for industrial applications like energy meters. Also due to its safety features it is used in applications like washing machines, dishwasher, and battery chargers. The AC..CS series from Vishay may be used in applications of different market segments, from consumer to industrial segment. There is a place for the AC..CS in a variety of circuitry types where safety requirements and high surge voltage are required.

SUMMARY

- Dual resistor: fusible-safety and high surge voltage
- Safe fusing without “spark” or “explosion”
- UL1412 recognized
- Inrush current limiting and circuit protection
- Perfect choice for designing energy meters and power supplies

In summary, Vishay AC03..CS and AC05..CS series are the most suitable products recommended in applications specifically with safety concerns. The products are UL certified which makes them ideal to be used in power applications, power supplies, and power meters.