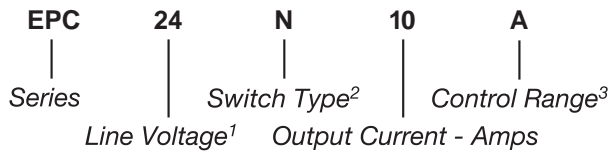


| Part Number | Description   |
|-------------|---------------|
| EPC24N10A   | 10A, 265 Vac  |
| EPC24N40A   | 40A, 265 Vac  |
| EPC24N40R   | 40A, 265 Vac  |
| EPC46N70A   | 70A, 460 Vac  |
| EPC46N110A  | 110A, 460 Vac |

**Part Number Explanation**



**NOTES**

- 1) Line Voltage (nominal): 24 = 240 Vac; 46 = 460 Vac
- 2) Switch Type: N = Phase Angle Control
- 3) Control Range: A = 0-10 Vdc; R = 4-20 mA

**MECHANICAL SPECIFICATION**

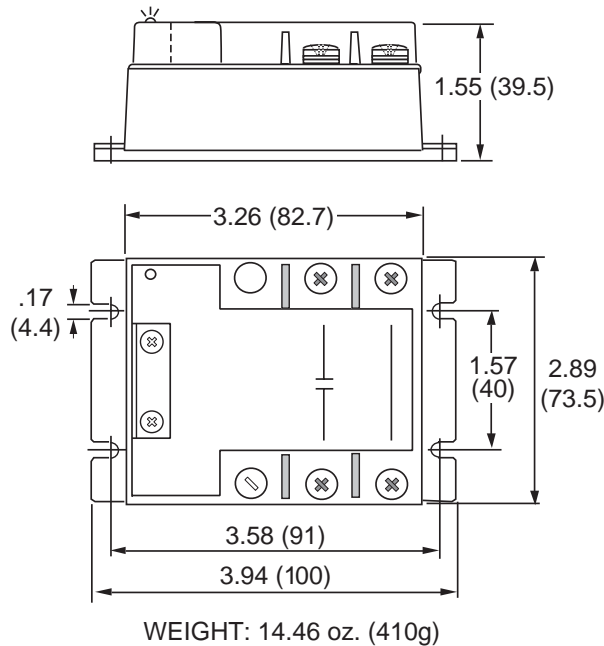


Figure 1 – EPC relays; dimensions in inches (mm)



**FEATURES/BENEFITS**

- External phase angle adjust
- Designed for all loads
- Excellent thermal performance
- Internal output protection
- Proportional control with voltage or current input.

**DESCRIPTION**

The Series EPC phase angle controller has an analog input isolated from the mains to vary the phase angle proportionally to the input and load voltage. The EPC phase angle controller is designed mainly for resistive loads. The EPC may be used with inductive loads, but with limitations. It provides internal protection from load transients. The conduction level is controlled by the input. The Series EPC provides an external adjust that allows the user to modify the cycle time for any particular application.

**APPLICATIONS**

- Lighting control (light dimming)
- Single-phase motors
- Heating control (regulation)

**TYPICAL APPLICATION**

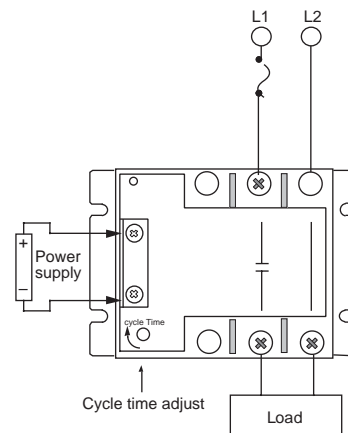


Figure 2 – EPC relays

**INPUT (CONTROL) SPECIFICATION**

|                                   | Min | Max    | Units |
|-----------------------------------|-----|--------|-------|
| <b>Control Voltage Range</b>      |     |        |       |
| EPCXXNXXA                         | 0   | 10     | V     |
| EPC24N40R                         | 1   | 5      | V     |
| <b>Control Current Range</b>      |     |        |       |
| EPC24N40R                         | 5.5 | 20     | mAdc  |
| <b>Must Turn-Off Voltage</b>      |     |        |       |
| EPCXXNXXA                         |     | 0.2    | V     |
| <b>Must Turn-Off Current</b>      |     |        |       |
| EPC24N40R                         |     | 4      | mA    |
| <b>Input Resistance (Typical)</b> |     |        |       |
| EPCXXNXXA                         |     | 400±2% | Ohms  |
| EPC24N40R                         |     | 0.25   | Ohms  |

**OUTPUT (LOAD) SPECIFICATION**

|  | Min | Max        | Unit  |
|--|-----|------------|-------|
| <b>Operating Range</b>                   |     |            |       |
| EPC24                                    | 115 | 265        | Vrms  |
| EPC46                                    | 200 | 460        | Vrms  |
| <b>Peak Voltage (Clamping Voltage)</b>   |     |            |       |
| EPC24                                    |     | 600 (450)  | Vpeak |
| EPC46                                    |     | 1200 (800) | Vpeak |
| <b>Internal Circuit Consumption</b>      |     |            |       |
| EPC24                                    |     | 7          | mArms |
| EPC46                                    |     | 4          | mArms |
| <b>Load Current Range (See Figure 8)</b> |     |            |       |
| EPC24N10A                                | .01 | 10         | Arms  |
| EPC24N40A                                | .01 | 40         | Arms  |
| EPC24N40R                                | .01 | 40         | Arms  |
| EPC46N70A                                | .01 | 70         | Arms  |
| EPC46N110A                               | .01 | 110        | Arms  |

**OUTPUT (LOAD) SPECIFICATION (Continued)**

|  | Min | Max    | Unit             |
|--|-----|--------|------------------|
| <b>Maximum Surge Current Rating (Non-Repetitive, See Figure 9)</b> |     |        |                  |
| EPC24N10A  |     | 120    | A                |
| EPC24N40A  |     | 550    | A                |
| EPC24N40R  |     | 550    | A                |
| EPC46N70A  |     | 1000   | A                |
| EPC46N110A   |     | 2000   | A                |
| <b>On-State Voltage Drop</b>                                       |     |        |                  |
| All relays   |     | 1.6    | V                |
| <b>Off-State Leakage Current</b>                                   |     |        |                  |
| EPC24N10A  |     | 4      | mArms            |
| EPC24N40A  |     | 4      | mArms            |
| EPC24N40R  |     | 4      | mArms            |
| EPC46N70A  |     | 5      | mArms            |
| EPC46N110A   |     | 5      | mArms            |
| <b>Turn-On Time</b>  |     |        |                  |
| All relays (60 Hz)   |     | 8.3    | ms               |
| <b>Turn-Off Time</b>   |     |        |                  |
| All relays   |     | 41.5   | ms               |
| <b>Operating Frequency (Trimmer must be adjusted)</b>              |     |        |                  |
| All relays   | 47  | 100    | Hz               |
| <b>Off-State dv/dt (Non-Repetitive)</b>                            |     |        |                  |
| All relays   |     | 500    | V/μs             |
| <b>I<sup>2</sup>t for Match Fusing (&lt;8.3ms)</b>                 |     |        |                  |
| EPC24N10A  |     | 72     | A <sup>2</sup> S |
| EPC24N40A  |     | 1500   | A <sup>2</sup> S |
| EPC24N40R  |     | 1500   | A <sup>2</sup> S |
| EPC46N70A  |     | 5000   | A <sup>2</sup> S |
| EPC46N110A   |     | 20,000 | A <sup>2</sup> S |

**EQUIVALENT CIRCUIT**

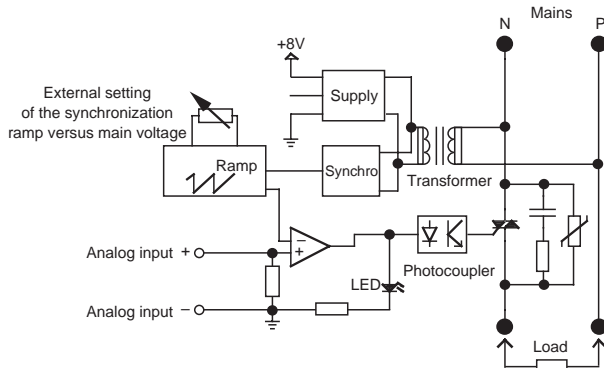


Figure 3 – EPC relays

**ENVIRONMENTAL SPECIFICATION**

|                                  | Min | Max  | Unit |
|----------------------------------|-----|------|------|
| Storage Temperature              | -40 | 85   | °C   |
| Operating Temperature            | -40 | 85   | °C   |
| Junction Temperature             | -40 | 125  | °C   |
| Junction-Case Thermal Resistance |     |      |      |
| EPC24N10A                        |     | 2.7  | °C/W |
| EPC24N40A                        |     | 1.1  | °C/W |
| EPC24N40R                        |     | 1.1  | °C/W |
| EPC46N70A                        |     | 0.43 | °C/W |
| EPC46N110A                       |     | 0.35 | °C/W |
| Input-Output Isolation           |     | 8    | pF   |
| Shock (@11ms)                    |     | 100  | G    |
| Vibrations (10 to 4000Hz)        |     | 50   | G    |

**EXTERNAL PHASE ANGLE ADJUST**



Setting position of the integrated trimmer: 180°

Setting position of the integrated trimmer: 90°

Figure 4 – EPC relays

**Input-Output Isolation @500m**

|            |      |      |
|------------|------|------|
| All relays | 2500 | Vrms |
|------------|------|------|

**Output-Case Isolation @500m**

|            |      |      |
|------------|------|------|
| EPC24N10A  | 2500 | Vrms |
| All relays | 3300 | Vrms |

**Rated Impulse Voltage**

|            |      |   |
|------------|------|---|
| EPC24N10A  | 2500 | V |
| All relays | 4000 | V |

**PRINCIPLE OF PHASE ANGLE CONTROL: INPUT/OUTPUT TRANSFER CHARACTERISTICS**

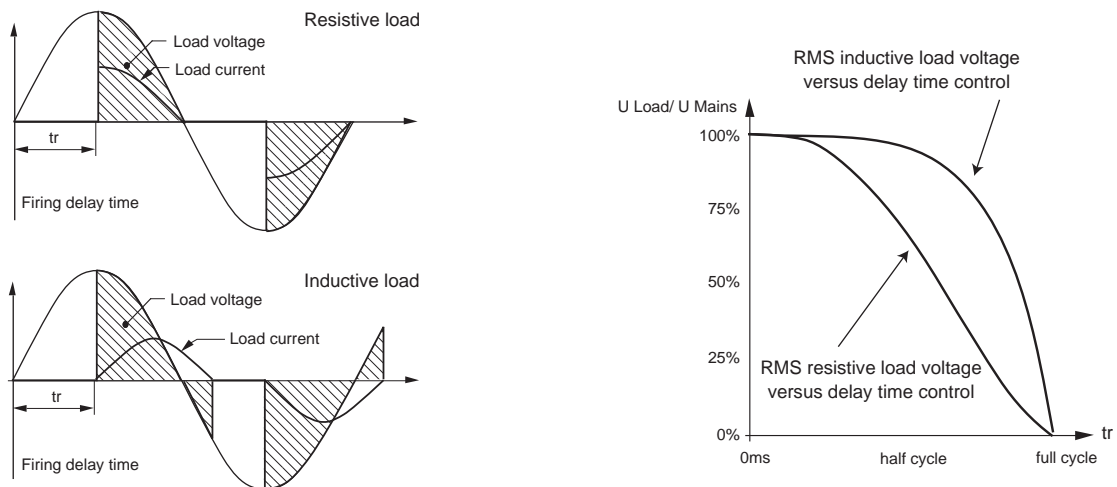


Figure 5 – EPC relays

**INPUT/OUTPUT TRANSFER CHARACTERISTICS**

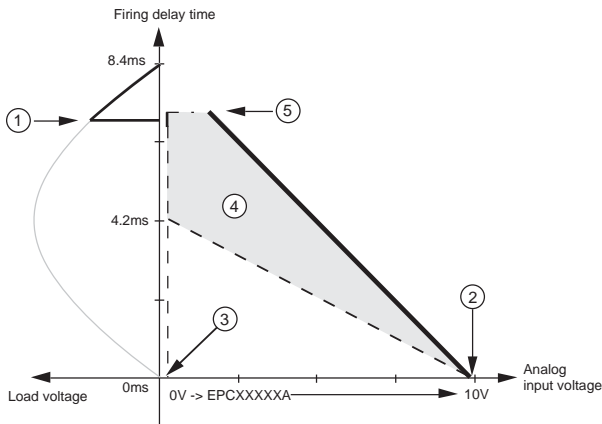


Figure 6a – EPCXXNXXA

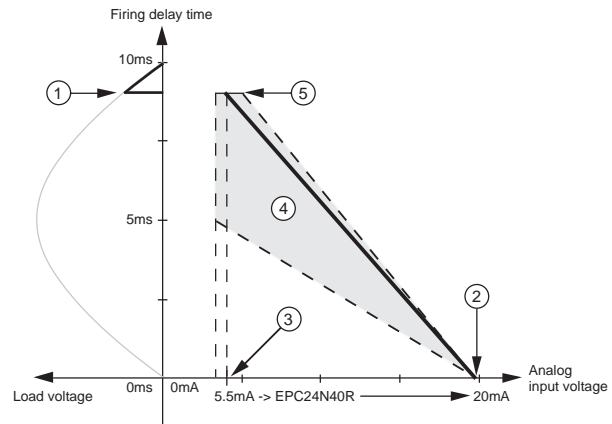


Figure 6b – EPC24N40R

- 1. Factory presetting to  $144^\circ \pm 10\%$  (@50Hz) of the initial maximum firing delay angle.** It can be modified by using the external phase angle adjust. A variation in the load voltage causes a small decrease of this angle. For 60Hz see item 4.
- 2. Full conduction mode voltage:** Control Voltage = 10 Vdc (+0; -5%)
- 3. Factory presetting to 0.2 Vdc  $\pm 0.1V$  of the minimum control input voltage.** Below 0.2Vdc, the relay is off; above 0.2Vdc, the relay is On at a firing delay angle that depends on the external phase angle adjust.
- 4. Possible presetting zone by using the external phase angle adjust.**
- 5. Firing delay angle limit:  $170^\circ$  (0; +5%);**  
Conditions: EPC24 @ 135 Vac, EPC46 @ 240Vac

- 1. Factory presetting to  $170^\circ \pm 10\%$  (@50Hz) of the initial maximum firing delay angle.** It can be modified by using the external phase angle adjust. A variation in load voltage causes a small decrease of this angle. For 60Hz see item 4.
- 2. Full conduction mode voltage:** 20 mA (+0; -10%)
- 3. Factory presetting to 5.5 mA (+10%; -0) of the minimum control input current.**
- 4. Possible presetting zone by using the external phase angle adjust.**
- 5. Firing delay angle limit:  $170^\circ$  (0; +5%);**  
Conditions: @135 Vac; Control input = 5.5 mA.

**TYPICAL FILTER EXAMPLES**

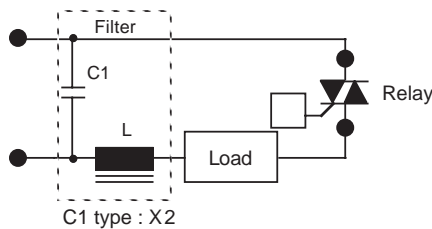


Figure 7a – Low currents

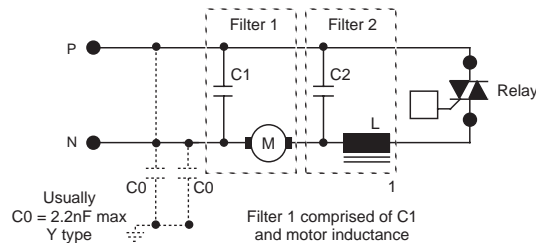


Figure 7b – High currents, filters in series

**THERMAL CHARACTERISTICS**

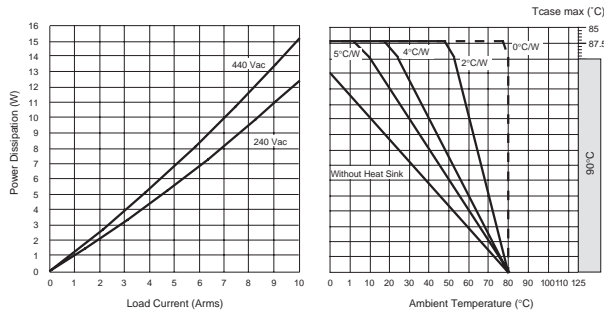


Figure 8a – EPC24N10A

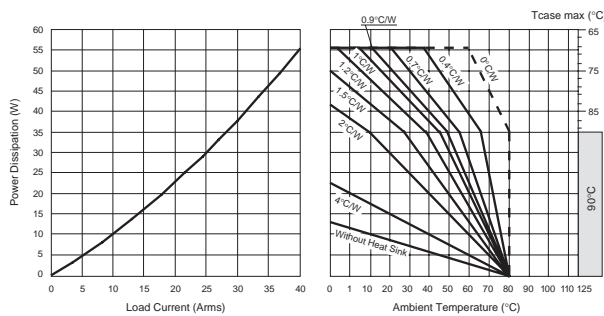


Figure 8b – EPC24N40A, EPC24N40R

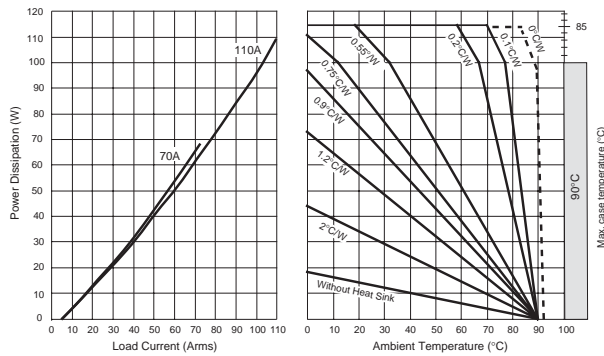


Figure 8c – EPC46N70A, EPC46N110A

**SURGE CURRENT**

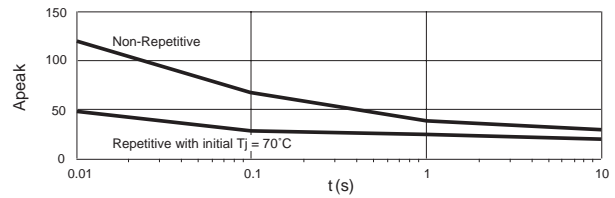


Figure 9a – EPC24N10A

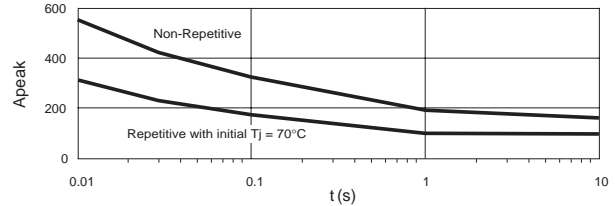


Figure 9b – EPC24N40A, EPC24N40R

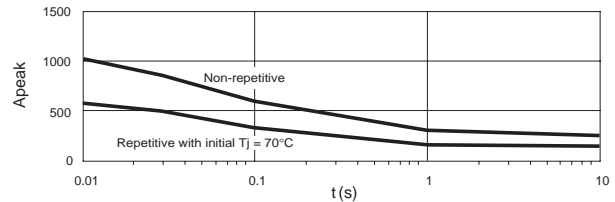


Figure 9c – EPC46N70A

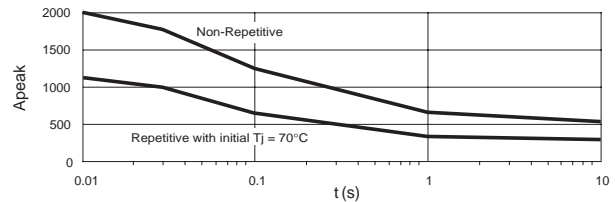


Figure 9d – EPC46N110A

**NOTES:**

1. Electrical specifications at 25°C unless otherwise specified.
2. Phase cutting generates RFI. Filters are recommended.
3. For inductive loads, contact factory.