Product Overview

The 40AA, 41AA, and 42AA series electronic motor protection modules combine high performance and function consolidation in order to provide reliable, cost effective protection for your motor needs. Used with Positive Temperature Coefficient (PTC) sensors the 40/41/42AA modules protect against locked rotor conditions, running overload and high ambient temperature. The innovative design offers additional functions as well, such as minimum off time delay, low voltage cutout and bearing temperature protection. Also the device is very safe and easy to calibrate for voltage (no jumper is required).

Thermal protection is achieved by monitoring the temperature of the motor windings with PTC sensors. These sensors can be the Klixon BA series or any other compatible PTC sensor rated Mark A or B. If the windings exceed the rated trip temperature the sensor undergoes a rapid change in resistance relative to the change in temperature. As a result of this change, the 40/41/42AA modules’ internal relays de-energize the control coil of the external line break contactor.

As the motor cools and acceptable motor winding temperatures have been restored the sensor resistance decreases to the reset level. At this point the module will reset itself automatically unless it was set up for manual reset. In this case the user is required to remove power from the system for a minimum of 5 seconds.

The 40/41/42AA series modules are ideal for many applications in the HVAC/R industry as well as for industrial systems. Some applications include global commercial rooftop A/C, global chiller applications, industrial pumps, material handlers, elevators, escalators, air compressors and industrial systems.

Product Specifications

<table>
<thead>
<tr>
<th>Maximum</th>
<th>Channels</th>
<th>Sensors/Channels</th>
<th>Line Voltage</th>
<th>Sensor Type</th>
<th>Time Delay</th>
<th>Low Voltage</th>
<th>Auto/Man Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>40AA110E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark A</td>
<td>None</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>40AA115E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark A</td>
<td>5 min.</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>41AA105A</td>
<td>3</td>
<td>1</td>
<td>24</td>
<td>Mark B</td>
<td>4 min.</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>41AA1500E</td>
<td>3</td>
<td>1</td>
<td>120/240</td>
<td>Mark B</td>
<td>None</td>
<td>None</td>
<td>Manual</td>
</tr>
<tr>
<td>41AA1600A</td>
<td>3</td>
<td>1</td>
<td>24V</td>
<td>Mark B</td>
<td>2 min.</td>
<td>Yes</td>
<td>Automatic</td>
</tr>
<tr>
<td>41AA1606</td>
<td>3</td>
<td>1</td>
<td>120/240</td>
<td>Mark B</td>
<td>2 min.</td>
<td>Yes</td>
<td>Automatic</td>
</tr>
<tr>
<td>41AA1600E</td>
<td>3</td>
<td>1</td>
<td>120/240</td>
<td>Mark B</td>
<td>4 min.</td>
<td>Yes</td>
<td>Automatic</td>
</tr>
<tr>
<td>42AA1000E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark B</td>
<td>None</td>
<td>None</td>
<td>Manual</td>
</tr>
<tr>
<td>40AA100E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark B</td>
<td>None</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>40AA300E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark B</td>
<td>4 min.</td>
<td>Yes</td>
<td>Automatic</td>
</tr>
<tr>
<td>41AA1540E</td>
<td>3</td>
<td>1</td>
<td>120/240</td>
<td>Mark B</td>
<td>None</td>
<td>Yes</td>
<td>Manual</td>
</tr>
<tr>
<td>40AA200E</td>
<td>1</td>
<td>3</td>
<td>120/240</td>
<td>Mark B</td>
<td>4 min.</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>40AA100A</td>
<td>1</td>
<td>3</td>
<td>24V</td>
<td>Mark B</td>
<td>None</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>40AA300A</td>
<td>1</td>
<td>3</td>
<td>24V</td>
<td>Mark B</td>
<td>4 min.</td>
<td>None</td>
<td>Automatic</td>
</tr>
<tr>
<td>40AA102A</td>
<td>1</td>
<td>2</td>
<td>24V</td>
<td>Mark B</td>
<td>None</td>
<td>None</td>
<td>Automatic</td>
</tr>
</tbody>
</table>

General Specifications

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
<th>Min.</th>
<th>Typical</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature Range</td>
<td>°C</td>
<td>-40</td>
<td>+70</td>
<td></td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated Line Frequency</td>
<td>Hz</td>
<td>45</td>
<td>50/60</td>
<td>62</td>
</tr>
<tr>
<td>Low Voltage Cut-Out Trip (24V Input)</td>
<td>VAC</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Low Voltage Cut-In Reset</td>
<td>VAC</td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Low Voltage Cut-Out Trip (120V Input)</td>
<td>VAC</td>
<td>79.5</td>
<td>85</td>
<td>90.5</td>
</tr>
<tr>
<td>Low Voltage Cut-In Reset</td>
<td>VAC</td>
<td>160</td>
<td>170</td>
<td>180</td>
</tr>
<tr>
<td>Low Voltage Cut-Out Trip (240V Input)</td>
<td>VAC</td>
<td></td>
<td></td>
<td>184</td>
</tr>
<tr>
<td>Low Voltage Cut-In Reset</td>
<td>VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Printed in U.S.A. 11/2003
**40/41/42AA Series**  
**ELECTRONIC**  
**MOTOR PROTECTION**

---

**Electrical Schematic**

40AA, 42AA Series

![40AA, 42AA Series Electrical Schematic](image1)

41AA Series

![41AA Series Electrical Schematic](image2)

---

**Protected Conditions**

- Locked Rotor
- Running Overload
- High Motor Ambient
- Blocked Ventilation
- Single Phasing
- Loss of Hermetic Compressor Charge

---

**Summary of Protection Features**

- Thermal overload of Windings
- Low Voltage Cutout
- Electrically - Isolated Power Supply
- Power Off Manual Reset
- Automatic Reset with Minimum Off Delay Timer
- UL File Number SA3745 (41AA)
- UL/CSA/CE pending on all other ratings

---

**Specifications**

Supply Voltages........ 24VAC or 115-230 VAC (±15%)

Frequency.................. 50/60 Hz

Control Circuit............ 2.5A, 600VA, 250V Max.

Minimum Permissible Load...... 5VDC, 100mA

Maximum Load.............. 30VDC

Cycle Life.................. 250k Cycles Min.

Weight........................ 290 Grams

---

**Ensemble Drawing**

40AA, 42AA Series

![40AA, 42AA Series Envelope Drawing](image3)

41AA Series

![41AA Series Envelope Drawing](image4)

---

**Thermal Motor Specification***

**40AA Single Channel Ratings (Series Sensors)**

- Sensor Trip Resistance
- Sensor Reset Resistance
- Sensor Resistance @ 25°C

**Nominal Resistance**

- 28.0 KΩ
- 11.0 KΩ
- 1.5 - 7.5 KΩ

**41AA Three Channel Ratings (Parellel Sensors)**

- Sensor Trip Resistance
- Sensor Reset Resistance
- Sensor Resistance @ 25°C

**Nominal Resistance**

- 14.0 KΩ
- 3.25 KΩ
- 0.5 - 2.5 KΩ

**42AA Single Channel Ratings (Series Sensors)**

- Sensor Trip Resistance
- Sensor Reset Resistance
- Sensor Resistance @ 25°C

**Nominal Resistance**

- 20.0 KΩ
- Manual Reset
- 1.5 - 7.5 KΩ

---

*Resistance measurement with analog meter instrument on Mark B sensors.

---

Important Notice: Texas Instruments (TI) reserves the right to make changes to or discontinue any product or service identified in this publication without notice. TI advises its customers to obtain the latest version of the relevant information to verify, before placing any orders, that the information being relied upon is current. TI assumes no responsibility for infringements of patents or rights of others based on TI applications assistance or product specifications since TI does not possess full access concerning the use or application of customers' products. TI also assumes no responsibility for customers' product designs.

---

For further information write or call:

Texas Instruments Incorporated  
34 Forest St., MS 2-3  
Attleboro, MA 02703-0964  
Phone: (508) 236-3617  
Fax: (508) 236-1949  
www.ti.com/snc/products/controls/motor-aa.htm

---

Printed in U.S.A. 11/2003