The EAGLE EPAC M40 Series Controller Unit is a fully actuated controller unit with a full complement of operational, programming, and diagnostics capabilities. The M40 Series Controller Unit EXCEEDS both NEMA TS 1-1989 and TS 2-2003 Actuated Controller Unit Standards.

The M40 Series Controller Unit has an LCD alphanumeric backlit display (8-line - 40 char/line). Programming is easy and error free using English Language Menus. Within a menu, each parameter can be viewed and a cursor moved to that parameter for changes. Related parameters are visible simultaneously, making verification an easy matter. The screen provides both programming area identification and editing prompts.

### Hardware Features
- Exceeds NEMA TS-1 and TS-2 standards for traffic controllers
- Front Panel multi-line alphanumeric backlit display for all operational parameters and states
- Fully prompted, menu driven programmability
- EEPROM technology is used to retain all timing and control parameters even during power outages. No batteries are required for retention of traffic parameters.

### Coordination Modes
- Permissive Mode
- Yield Mode
- Permissive Yield Mode
- Permissive Omit Mode
- Sequential Omit Mode
- Full Actuated Mode

### Adaptive Traffic Control
- 16 Vehicle Phases
- 16 Pedestrian Phases
- 4 Timing Rings
- 16 Overlaps
- 80 Detectors
- Adaptive Maximum Routines
- Adaptive Protected/Permissive Routines
- Coordination Virtual Split Routine

### Preemption/Priority
- 6 Preempt Routines
- 6 Priority Routines

### Other Features
- Diagnostics & Status Displays
- Reports

---

**Reports**
The M40 Series Controller Unit provides extensive reporting capability. Each report entry includes the Date and Time of occurrence.
- Local Alarm Log, stores up to 120 events
- Comm Fault Log, stores up to 60 events
- Detector Fault Log, stores up to 60 events
- System Detector Log, stores up to 60 events
- MOE Log, stores up to 24 events
- Speed Log, stores up to 24 events
- Volume Count Log, stores up to 72 events
- Cycle MOE Log, stores up to 60 events
- MMU Fault Log, stores up to 10 events

---

**Diagnoses & Status Displays**
A resident diagnostic program is standard in the M40 Series Controller Unit. In addition to the extensive displays to aid in intersection setup, monitoring, and operation, the resident diagnostic program enhances the maintenance and troubleshooting of the controller assembly.
- Monitor Compatibility Diagnostics
- Monitor Field Status Diagnostics
- Cycling Diagnostics
- Detector Diagnostics
- Port 1 Message Display
- Port 2 Comm Status Display
- Port 3 Comm Status Display
- Hardware I/O Status Display
- MMU Status Display

---

### SPECIFICATIONS
- **Physical Dimensions**
  - 229mm H x 381mm W x 203mm D
  - 9" H x 15" W x 8" D
- **Power Consumption**
  - 25 Watts (typical) · 120 Watts (max)
  - 89 to 135 VAC · 57 to 63 Hz
- **Weight**
  - 6 kg (typical)
  - 14 lbs. (typical)
- **Temperature**
  - -34°C to +74°C
  - -30° F to +165° F

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For more advanced future features and/or more information on Siemens hardware products call (512) 837-8310 or call your local dealer (see website for the dealer in your area).

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A Look at the EAGLE EPAC M40 Series Controller...

TS-2 Type 1 and 2 Features
TS-2, Type 1 Actuated Controller Unit is a performance oriented controller unit using a high speed data channel between all major components within the Terminal and Facilities.

TS-2, Type 2 Actuated Controller Unit includes all the features of the Type 1 and adds the following:
1. MSA, MSB, and MSC connectors for data exchange with the Terminals & Facilities. This provides a degree of downward compatibility with NEMA TS-1 counterparts.
2. 37 pin "D" connector for backward compatibility with TS-1 counterparts.

TS-2 Advantages
Controller assemblies with TS-2 Detector Racks provide increased capability, consume less power, and provide additional diagnostic data to the Controller Unit via the SDLC port. The Controller Unit can take corrective action much earlier than one based on internal diagnostics.

Controller assemblies with TS-2 Monitors provide additional diagnostic data to the Controller Unit via the SDLC port.

Six Modes of Coordination

Permissive Mode provides non-actuated coord phase, vehicle and pedestrian, with permissive windows opened phase by phase to the non-coord phases.

Yield Mode provides non-actuated coord phase, vehicle and pedestrian, with a single permissive window for all non-coord phases.

Permissive Yield Mode provides for actuated coord phase, vehicle and pedestrian, with permissive windows opened phase by phase to the non-coord phases. Additionally, the coord phase vehicle may extend its green time at the beginning of the first permissive window.

Permissive Omit Mode provides operation similar to the Permissive Yield Mode, except that the coord phase, once terminated, is prevented from operating protected or permissive.

Sequential Omit Mode provides operation similar to the Permissive Yield Mode, except that the coord phase, once terminated, is prevented from occurring prior to the end of the last permissive.

Full Actuated Mode provides operation similar to the Permissive Yield Mode, except that any phase may be serviced and reserved in the standard sequence following the first permissive and through the last permissive.

Adaptive Traffic Control

Adaptive Traffic Control is a highly flexible routine operating within the M40 Series Controller Unit. Included are:
- 250 Events for the control of Pattern Selection, Free, Flash, Dimming, Detector Diagnostic Parameters, System Detector Logging, 3 Auxiliary Functions, 16 Traffic Functions
- 99 Day Programs
- 10 Week Programs

Time Base Control

Adaptive Maximum Routines which are enabled via Time Base, offer Free separate Step values to cause the running maximum to increase or decrease smoothly based on current traffic conditions. Separate Dynamic Maximum parameters are available for each Step value.

Adaptive Protected / Permissive Routines measure the volume of Left Turn vehicle traffic and available gap windows in the conflicting Through-Vehicle traffic to determine whether the Left Turn should operate protected or permissive.

Coordination Virtual Split Routine provides for actuated coord phase vehicle and pedestrian modes. This control provides for a period of time of each cycle which is distributed to the Coord Phase(s) or non-coord phases, based on Coord Phase vehicle traffic activity.

Coordination Adaptive Split Routines which are enabled via Time Base adjust split times smoothly based on current traffic conditions.

Preemption/Priority

Preemption/Priority is a highly flexible routine operating within the M40 Series Controller Unit. Included are:
- 6 Preempt Routins providing complete signal control
- 6 Priority Routines providing complete phase control and in-sync return to coordination

Preempt activity can be monitored on a Preempt Status display which denotes:
- Preempt In Control, Interval Timing, & Interval Countdown
- Individual Preempt Status & Timing
- Individual Priority Status & Timing

Security

The M40 Series Controller Unit provides for a user specified security code entry before data may be altered. This security code entry is not required to view any parameters. The M40 Series Controller Unit can also disable security code requirements for perpetual access.

Ordering Matrix

<table>
<thead>
<tr>
<th>EPAC3</th>
<th>1</th>
<th>0</th>
<th>8</th>
<th>M40</th>
<th>C/S</th>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>

Adapted Controller

<table>
<thead>
<tr>
<th></th>
<th>Additional Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C = Capacitor Backup</td>
</tr>
<tr>
<td></td>
<td>S = IC Sockets</td>
</tr>
</tbody>
</table>

M42 - TS-2, Type 2
Includes:
- MSA, MSB, and MSC Connectors
- Port 1 SDLC (15 pin)
- Port 2 RS232 (25 pin)
- Port 3 RS232 (9 pin)
- Port 3 RS232 (25 pin)
- Port 3 "D" Connector (37 pin)
- Port 3 Connector (FSK 9 pin)

M41 - TS-2, Type 1
Includes:
- Port 1 SDLC (15 pin)
- Port 2 RS232 (25 pin)
- Port 3 RS232 (9 pin)
- Port 3 RS232 (25 pin)
- Port 3 Connector (FSK 9 pin)

M40 - TS-1
Includes:
- MSA, MSB, and MSC Connectors
- Port 2 RS232 (25 pin)
- Port 3 RS232 (25 pin)
- Port 3 "D" Connector (37 pin)

Number of Phases

<table>
<thead>
<tr>
<th>Option A (Port 3 Options)</th>
<th>1 = Standard (no modem)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 = Port 3 FSK 4-wire</td>
</tr>
<tr>
<td></td>
<td>6 = Port 3 FSK 2-wire</td>
</tr>
<tr>
<td></td>
<td>7 = Port 3 Single Mode Fiber</td>
</tr>
<tr>
<td></td>
<td>8 = Port 3 Multi-Mode Fiber</td>
</tr>
</tbody>
</table>

Security+Intelligence
A Look at the EAGLE EPAC M40 Series Controller...

**TS-2 Type 1 and 2 Features**

TS-2, Type 1 Actuated Controller Unit is a performance oriented controller unit using a high speed data channel between all major components within the Terminal and Facilities.

TS-2, Type 2 Actuated Controller Unit includes all the features of the Type 1 and adds the following:

1. MSA, MSB, and MSC Connectors for data exchange with the Terminals & Facilities. This provides a degree of downward compatibility with NEMA TS-1 counterparts.
2. 37 pin "D" connector for backward compatibility with TS-1 counterparts.

**TS-2 Advantages**

Controller assemblies with TS-2 Detector Racks provide increased capability, consume less power, and provide additional diagnostic data to the Controller Unit via the SDLC port. The Controller Unit can take corrective action much earlier than one based on internal diagnostics.

Controller assemblies with TS-2 Monitors provide additional diagnostic data to the Controller Unit via the SDLC port.

**Six Modes of Coordination**

**Permissive Mode** provides non-actuated coord phase, vehicle and pedestrian, with permissive windows opened phase by phase to the non-coord phases.

**Yield Mode** provides non-actuated coord phase, vehicle and pedestrian, with a single permissive window for all non-coord phases.

**Permissive Yield Mode** provides for actuated coord phase, vehicle and pedestrian, with permissive windows opened phase by phase to the non-coord phases. Additionally, the coord phase vehicle may extend its green time at the beginning of the first permissive window.

**Permissive Omit Mode** provides operation similar to the Permissive Yield Mode, except that the coord phase, once terminated, is prevented from re-entering the coordination before data may be altered to view any parameters. The M40 Series Controller Unit can also disable security code requirements for perpetual access.

**Coordination Adaptive Split Routine** provides for a period of time of each cycle which is distributed to the Coord Phase(s) or non-coord phases, based on Coord Phase vehicle traffic activity.

**Coordination Virtual Split Routine** provides for actuated coord phase, vehicle and pedestrian modes. This control provides for a period of time of each cycle which is distributed to the Coord Phase(s) or non-coord phases, based on Coord Phase vehicle traffic activity.

**Adaptive Traffic Control**

Simple or highly complex control including:

- 16 Vehicle Phases
- 16 Pedestrian Phases
- 4 Timing Rings
- 16 Overlaps
- 80 Detectors

**Adaptive Maximum Routines** which are enabled via Time Base, offer free separate Step values to cause the running maximum to increase or decrease smoothly based on current traffic conditions. Separate Dynamic Maximum parameters are available for each Step value.

**Adaptive Protected / Permissive Routines** measure the volume of Left Turn vehicle traffic and available gap windows in the conflicting Through-Vehicle traffic to determine whether the Left Turn should operate protected or permissive.

**Coordination Virtual Split Routine** provides for actuated coord phase, vehicle and pedestrian modes. This control provides for a period of time of each cycle which is distributed to the Coord Phase(s) or non-coord phases, based on Coord Phase vehicle traffic activity.

**Coordination Adaptive Split Routines** which are enabled via Time Base adjust split times smoothly based on current traffic conditions.

**Time Base Control**

Internal Time Base Control is a highly flexible routine operating within the M40 Series Controller Unit. Included are:

- 250 Events for the control of Pattern Selection, Free, Flash, Dimming, Detector Diagnostic Parameters, System Detector Logging, 3 Auxiliary Functions, 8 Special Functions, 16 Traffic Functions
- 99 Day Programs
- 10 Week Programs

**Preemption/Priority**

Internal Preemption is a highly flexible routine operating within the M40 Series Controller Unit. Included are:

- 6 Preempt Routines providing complete signal control
- 6 Priority Routines providing complete phase control and in-sync return to coordination

Preempt activity can be monitored on a Preempt Status display which denotes:

- Preempt In Control, Interval Timing, & Interval Countdown
- Individual Preempt Status & Timing
- Individual Priority Status & Timing

**Security**

The M40 Series Controller Unit provides for a user specified security code entry before data may be altered. This security code entry is not required to view any parameters. The M40 Series Controller Unit can also disable security code requirements for perpetual access.

**TS-2, Type 2**

- Includes: MSA, MSB, and MSC Connectors
- Port 1 SDLC (15 pin)
- Port 2 RS232 (25 pin)
- Port 3 RS232 (9 pin)
- Port 3 Connector (FSK 9 pin)

**TS-2, Type 1**

- Includes: MSA, MSB, and MSC Connectors
- Port 1 SDLC (15 pin)
- Port 2 RS232 (25 pin)
- Port 3 RS232 (9 pin)
- Port 3 Connector (FSK 9 pin)

**TS-1**

- Includes: MSA, MSB, and MSC Connectors
- Port 2 RS232 (25 pin)
- Port 3 RS232 (25 pin)
- Port 3 Connector (FSK 9 pin)

**TS-1 Options**

- Option A (Port 3 Options)
- 8 = Port 3 Multi-Mode Fiber
- 4 = Port 3 FSK 2-wire
- 6 = Port 3 FSK 4-wire
- 7 = Port 3 Single Mode Fiber
- 8 = Port 3 Multi-Mode Fiber

**TS-2 Options**

- Option B
- 0 = None
- 1 = Standard (no modem)
- 4 = Port 3 FSK 4-wire
- 6 = Port 3 FSK 2-wire
- 7 = Port 3 Single Mode Fiber
- 8 = Port 3 Multi-Mode Fiber

**TS-2 Features**

- 80 Detectors
- 16 Overlaps
- 4 Timing Rings
- 16 Pedestrian Phases
- 16 Vehicle Phases
- 80 Detectors
- 99 Day Programs
- 10 Week Programs

**TS-2/TS-1 Compatibility**

- Includes: Port 1 SDLC (15 pin)
- Includes: MSA, MSB, and MSC Connectors
- Includes: Port 1 SDLC (15 pin)
- Includes: Port 1 SDLC (15 pin)

**TS-2/TS-1 Features**

- 80 Detectors
- 16 Overlaps
- 4 Timing Rings
- 16 Pedestrian Phases
- 16 Vehicle Phases
- 80 Detectors
- 99 Day Programs
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EAGLE EPAC M40 NEMA Controller

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### Hardware Features
- Exceeds NEMA TS-1 and TS-2 standards for traffic controllers
- Front Panel multi-line alphanumeric backlit display for all operational parameters and states
- Fully prompted, menu driven programmability
- EEPROM technology is used to retain all timing and control parameters even during power outages. No batteries are required for retention of traffic parameters.

### Coordination Modes
- Permissive Mode
- Yield Mode
- Permissive Yield Mode
- Permissive Omit Mode
- Sequential Omit Mode
- Full Actuated Mode

### Adaptive Traffic Control
- 16 Vehicle Phases
- 16 Pedestrian Phases
- 4 Timing Rings
- 16 Overlaps
- 40 Detectors
- Adaptive Maximum Routines
- Adaptive Protected/Permissive Routines
- Coordination Virtual Split Routine

### Preemption/Priority
- 6 Preempt Routines
- 6 Priority Routines

### Other Features
- Diagnostics & Status Displays
- Reports

### Golden RAT Test

Siemens Energy & Automation, Inc.
Business Unit Intelligent Transportation Systems
8004 Cameron Road
Austin, TX 78754
Ph: (512) 837-8310
Fax: (512) 837-0196

http://www.itssiemens.com

---

**Reports**
The M40 Series Controller Unit provides extensive reporting capability. Each report entry includes the Date and Time of occurrence.

- Local Alarm Log, stores up to 120 events
- Comm Fault Log, stores up to 60 events
- Detector Fault Log, stores up to 60 events
- System Detector Log, stores up to 96 events
- MOE Log, stores up to 24 events
- Speed Log, stores up to 24 events
- Volume Count Log, stores up to 72 events
- Cycle MOE Log, stores up to 60 events
- MMU Fault Log, stores up to 10 events

**Diagnostics & Status Displays**
A resident diagnostic program is standard in the M40 Series Controller Unit. In addition to the extensive displays to aid in intersection setup, monitoring, and operation, the resident diagnostic program enhances the maintenance and troubleshooting of the controller assembly.

- Monitor Compatibility Diagnostics
- Monitor Field Status Diagnostics
- Cycling Diagnostics
- Detector Diagnostics
- Port 1 Message Display
- Port 2 Comm Status Display
- Port 3 Comm Status Display
- Hardware I/O Status Display
- MMU Status Display

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**SPECIFICATIONS**

<table>
<thead>
<tr>
<th><strong>Physical Dimensions</strong></th>
<th><strong>Power Consumption</strong></th>
<th><strong>Temperature</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>229mm H x 381mm W x 203mm D</td>
<td>25 Watts (typical) · 120 Watts (max)</td>
<td>-34°C to +74°C</td>
</tr>
<tr>
<td>9&quot; H x 15&quot; W x 8&quot; D</td>
<td>89 to 135 VAC · 57 to 63 Hz</td>
<td>-20°F to +180°F</td>
</tr>
<tr>
<td>6 kg (typical)</td>
<td>6 kg (typical)</td>
<td></td>
</tr>
<tr>
<td>14 lbs. (typical)</td>
<td>14 lbs. (typical)</td>
<td></td>
</tr>
</tbody>
</table>

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**Hardware Design**
The M40 Series Controller Unit is designed for efficient operation and ease of maintenance. The chassis is of metal and is designed for easy access to the boards for testing without disassembly.

To insure the accuracy of traffic control parameters, even during power outages, EEPROM technology is used to retain all timing and control parameters. No batteries are required for retention of traffic parameters. Event logging and Time Base clock utilize RAM memory for those functions with battery support.