

MMU-16LE *SmartMonitor*[™] MMU-16LEip *SmartMonitor*[™]

TS2 Enhanced LCD Malfunction Management Unit (MMU)

Description

The MMU-16LE *SmartMonitor* is a Malfunction Management Unit which meets or exceeds all specifications of Section 4 of the NEMA TS2-2003 Standard. The MMU operates in either a TS2 Type 1 or Type 2 cabinet. Both cabinet types require that an MMU be interfaced to the controller via the TS2 standardized high-speed Synchronous Data Link Control (SDLC) serial bus. The MMU-16LE *SmartMonitor* can also operate as a Type 16 or a Type 12 MMU. Type 16 mode provides 16 channels (typically 8 vehicle, 4 ped, 4 overlap), where each channel consists of three 120 VAC inputs (Green/Walk, Yellow, Red/Don't Walk). Type 12 mode provides 12 channels (typically 8 vehicle, 4 overlap), where each channel consists of four 120 VAC inputs (Green, Yellow, Red, Walk). Type 12 mode provides downward compatibility with a Conflict Monitor Unit (CMU) conforming to TS1. The MMU-16LE *SmartMonitor* can also provide standardized Port 1 SDLC communications to a TS2 Type 2 controller in a TS1 cabinet. This allows the full diagnostic capabilities of the MMU-16LE *SmartMonitor* to operate in a legacy TS1 cabinet without any wiring modifications to the cabinet.

Built-in Set Up Wizard

The built-in Set Up Wizard configures the MMU-16LE *SmartMonitor* enhanced-feature programming using a simple series of intersection related questions. It allows a technician to accurately and completely program the MMU-16LE *SmartMonitor* enhanced functions, bypassing the need for understanding the complexities of monitor parameters, terminology, or procedures.

Built-in Diagnostic Wizard

The built-in Diagnostic Wizard is an integral part of the context sensitive Help System that provides detailed diagnostic information regarding the fault being analyzed.

The Diagnostic Wizard provides a concise view of the signal states involved in the fault, directly and automatically pinpoints faulty signal inputs, then provides guidance on how the technician should isolate the cause of the malfunction. The Diagnostic Wizard is automatically invoked when the MMU-16LE *SmartMonitor* is in the fault mode and the HELP button is pressed.



Features

- Meets NEMA TS2-2003 MMU Standard
- Full intersection LCD back-lighted signal display
- Built-in Set up Wizard automatically configures enhanced parameters
- Built-in Diagnostic Wizard automatically pinpoints faulty inputs
- Full event logging capabilities including five Signal Sequence logs
- Compatible with any TS2 Type 1 or Type 2 cabinet
- Downward compatible with TS1 CMU, including new Type 12 with SDLC mode
- The MMU-16LEip model replaces the standard EIA-232 port with a 10/100 Mbps Ethernet port for remote communications with a Traffic Management Center
- A key component for safer traffic control

Enhanced Safety

The TS2 Standard helps ensure safer traffic control operation than the older TS1 and 170/179 standards. This is, in part, due to the fact that the TS2 specified MMU provides broader fault coverage than older CMUs. In addition to monitoring load switch outputs, the MMU-16LE SmartMonitor is in continual communication with the TS2 Controller Unit via the SDLC bus, with a data exchange every 100 msec. Both the MMU-16LE *SmartMonitor* and Controller Unit have access to the same diagnostic information and can put the intersection into flash, thus providing redundancy of the MMU function, should the cabinet relay system fail to operate. This communication also provides the basis for the MMU-16LE *SmartMonitor* Diagnostic Wizard function.

MMU-16LE SmartMonitor Enhanced Functions

- An icon-based full intersection display on the front panel makes most improper field signal conditions immediately recognizable. Monitor status, logs, and configuration parameters are displayed on a separate alpha-numeric back-lighted LCD.
- The Field Check function monitors for any difference between the actual load switch output and the programmed Controller Unit output, ten times per second. This is an extra safety feature and a powerful trouble-shooting tool for the technician. Field Checking provides the basis for the MMU-16LE *SmartMonitor* Diagnostic Wizard.
- Dual Indications are on the same channel for Green and Yellow, Green and Red, Yellow and Red, Walk and Yellow, or Walk and Red. Dual Indication monitoring is also the only way to detect a no-load condition on the Red field output or a constantly active Red signal.
- Minimum Yellow Clearance monitor detects a missing or short Yellow interval for a vehicle channel.
- Minimum Yellow + Red Clearance monitor detects a missing or short clearance interval for a pedestrian channel or overlap without a true Yellow output.
- Recurrent Pulse monitoring responds to voltage fluctuations on load switch outputs, which result in flickering or unwanted dimming. Such conditions may reflect problems which could result in unsafe signal indications. Any indication of a problem that involves intermittent operation is extremely helpful to a technician trying to diagnose a cabinet malfunction.
- Field signal Root Mean Square (RMS) voltages, monitor status, and event logs are viewable via the front panel LCD Status Display without the need for a laptop PC connection.
- Event logging provides a detailed and accurate time-stamped record of previous faults, fault resets, AC line events, and configuration changes. Five Signal Sequence logs display all signal states for up to 30 seconds prior to the fault. The MMU-16LE *SmartMonitor* is compatible with the ECom Signal Monitor software.
- The use of Ethernet to communicate with the MMU-16LEip SmartMonitor makes remote diagnostics even easier to accomplish. By furnishing the monitor with an IP address, the unit can be integrated into a wide area network (WAN). Communications may originate from a remote Traffic Management Center, local Controller Unit, or a direct connection to a laptop PC network adaptor.
- The MMU-16LE *SmartMonitor* performs self-diagnostics beyond those specified by TS2 at power-on, then on an ongoing basis. Diagnostics can also be operator initiated, in which case they will include all front panel display functions.
- Shadow memory on the MMU-16LE *SmartMonitor* Program Card will transfer all monitor configuration settings to another MMU-16LE *SmartMonitor* automatically.
- The LEDguard™ innovative signal thresholding technique is used to increase the level of monitoring protection when using LED-based signal heads.

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3360 E. La Palma, Anaheim, CA 92806-2856
 Tel: (714) 630-3700 • Fax: (714) 630-6349
 E-mail: sales@econolite.com
 www.econolite.com
 38414E0607-5

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