

- *Miscellaneous Fields in Vehicle Records.* Each vehicle record in **FUELMASTER** software has five miscellaneous fields that the system operator may elect to use. Each field may be used to differentiate one specific item from one vehicle to another, e.g. on-road vs. off-road purposes, three axle vs. two axle, etc.

FUEL MANAGEMENT SOFTWARE. **FUELMASTER** Windows Software is loaded on a PC and used to download transactions from, and upload information to, FMUs; provide reports using Crystal Reports; export data to fleet maintenance programs; and encode and update PROKEES available in MS Access/SQL Server databases.

The operating program is available in three basic configurations: Verifiable Miscellaneous Number (VMN), Verifiable Vehicle Identifier (VVI), or Commercial (COM) version. The VMN version utilizes Vehicle Keys and accepts the keypad entry of only those ID numbers loaded into the FMU. The VVI version utilizes User Keys and accepts only those vehicle numbers loaded into the FMU. The COM version utilizes Vehicle and/

or User Keys and, through keypad entry, records the input of a vehicle or user identification number. Because it does not contain a look-up table for these numbers, it accepts the entry of any number.

The **CENTRAL CONTROLLER** (*main computer holding **FuelMaster** database*) communicates with the FMU to download transaction data, upload authorization lists, prices, transaction and daily limits, or to change FMU configuration. The Central Controller may be any Microsoft Windows based personal computer (PC) having at a minimum a 3GHz Pentium 4 processor or equivalent, 2 GB of RAM, 6 GB free hard drive space, 12x CD-ROM, 33.6K analog modem (must be 100% Hayes compatible if dial-up is to be used with the FMU), and 1024 x 768 screen resolution, network connection, USB for key encoding and Windows 7/8 Professional Operating System. A PC and modem are not included with the base **FUELMASTER** system, but may be ordered through Syn-Tech Systems as part of a total package. Call **FuelMaster** for SQL Server requirements.

Interface and Wiring Requirements

FUELMASTER is adaptable to any fuel site configuration. In some cases, settings, modifications, and/or accessory equipment may be necessary to ensure compatibility with existing or proposed site equipment. Syn-Tech must be made aware of the following interfaces to ensure the delivered Fuel Management Unit (FMU) is compatible.

Interface Requirements

1. **Dispenser Control.** The base FMU contains 50 amp solid state relays capable of controlling two hose positions. Additional hose positions (up to 8 per FMU) must be specified in the order. Loads in excess of 50 amps will require added mechanical relays. An Electronic Dispenser Interface Kit is necessary for connections to electronic dispensers.
2. **Pulse Transmission.** FMUs are designed to work with 12 VDC contact closure and open collector pulsers, either filtered or non-filtered. Filtered pulses are limited to 9000 pulses per minute (i.e., a hose with a 100:1 pulser delivering 15 gallons per minute will return 1500 pulses). As many as 120,000 unfiltered pulses per minute may be interpreted, but quality pulser cable must be used and EMF interference must not be present.
3. **FMU-to-PC Communications.** A communications link between the FMU and PC is needed to download transaction data and upload authorization data. Communications are possible with an analog telephone line, wired or wireless network connection, or direct-connect through the use of a two-way ring-down device or direct connect cable.
4. **Data Logger/Transaction Printer.** Real-time captures of transaction data may be collected through an interface with a Data Logger (for electronic copies) and/or a serial printer (for hard copies). The Data Logger is contained within the FMU. The serial printer connection requires a conduit and RS-232 cable routed between the printer and FMU.
5. **Master Only Applications.** Transaction printers, most credit card interfaces, and tank monitor interfaces are only possible through Master FMUs.

Conduit and Wiring Requirements

Do not use solid core wire. All conduit must be metal, explosion-proof and installed in accordance with the National Electrical Codes (NEC). Recommended conduit is 3/4 inch. Wire sizes/quantities permitting, a limited number of 1/2 inch conduits may be used. The FMU will support inputs of eight 3/4 inch conduit and four 1/2 inch conduits.

FMUs have minimum power requirements. If powered from the same circuit as equipment with high current loads (i.e., dispensers with, or powering, pump motors) input power to the FMU may drop below the minimum power requirement. FMUs should be powered from a separate power source with a separate 115 Volt circuit breaker rated no less than 15 amps. If a separate FMU power source is not available, contact Syn-Tech Help Desk for alternate wiring methods. Workarounds are available. Recommended FMU power wire is 12 AWG THHN for distances to 400 feet. For greater distances wire size should be increased to 10 AWG.

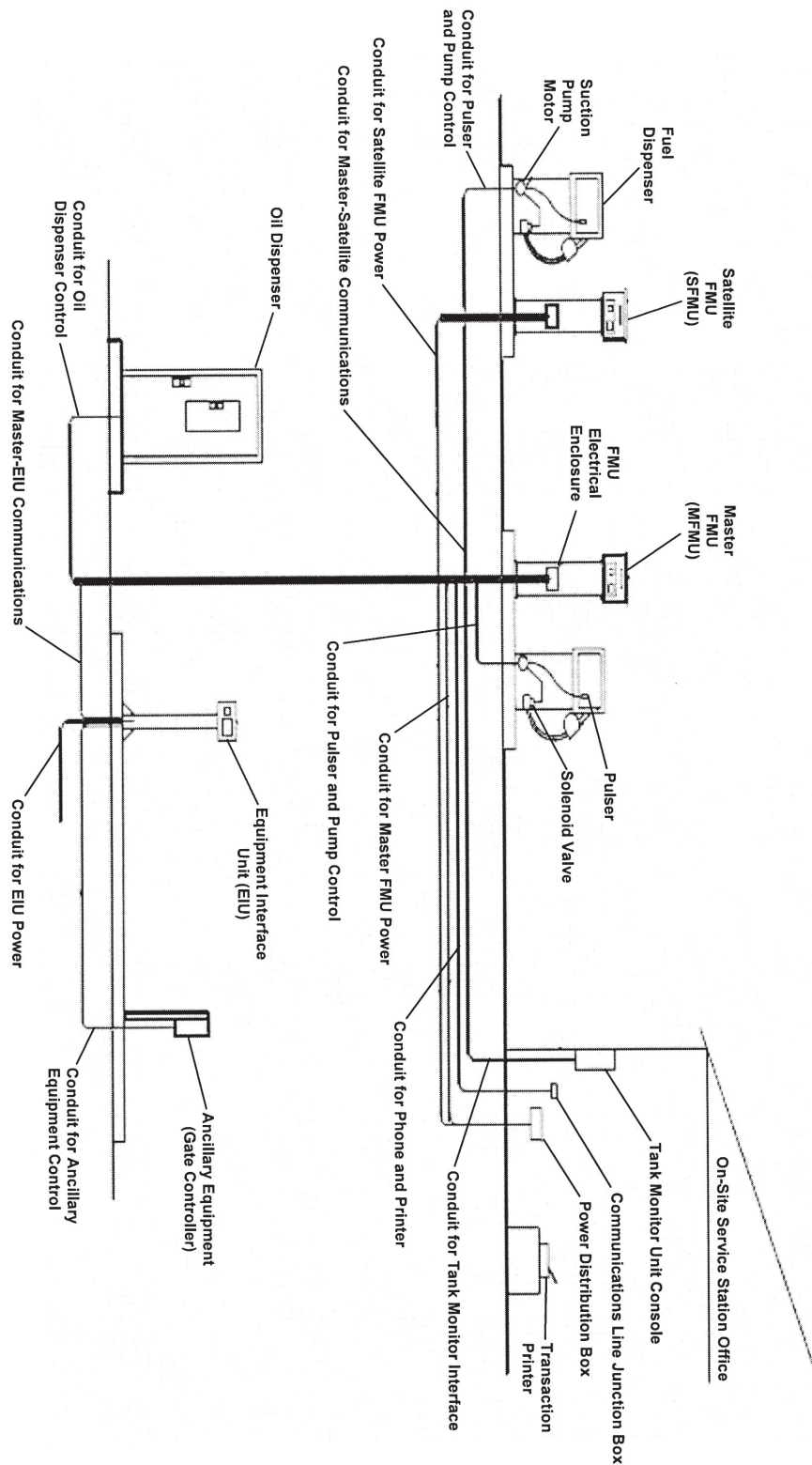
DC pulser wires and AC control wires may be routed through the same conduit providing the pulser wires are shielded and insulated for the maximum power carried through the conduit. Recommended pulser cable is 22 AWG shielded communication cable. Recommended control wire is 14 AWG THHN.

Telephone, direct connect, network, transaction printer, and tank monitor cables/lines may be routed together in the same conduit, but NOT through the same conduit as any AC power wires. For network applications, shielded Cat 5 cable may be used in runs up to 200 feet. At greater distances, fiber optic cables and converters should be used. Use of an easily accessible phone line to the FMU and Central Controller will much improve the availability and timeliness of Syn-Tech Help Desk support, if required. Recommended phone, direct connect, transaction printer, and tank monitor communication cable is 22 AWG shielded CMX (i.e., Belden 8723 2-pair, or equivalent).

Satellite FMUs may be wireless or via RS-422 communications cable (within 2000 feet of the master FMU). RS-422 connections within 300 feet may use 22 AWG. Distances greater than 300 feet should use 18 AWG.

Tank monitor interfaces may be wireless, or through either RS-232 or RS-422 communications cable between a Master FMU and the TMU console. Follow the TMU manufacturer's recommendations for maximum effective cable length. RS-232 should be used if cable length does not exceed maximum. Use RS-422 and a RS-232/RS-422 converter at the tank monitor for extended lengths. Recommended cable is 22 AWG shielded.

Typical FuelMaster Installation



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