

# MS-716

*Flow Totalizer, Ratemeter and Batcher for Vehicle & Skid Mounting*

## Features

- NEW! - Vehicle Mount Enclosure; Rugged Aluminum Construction
- Class I, Div II Option Available
- Provisions for Sealing
- "EZ Setup" Guided Setup for First Time Users
- Rate/Total and Batching Functions
- Menu Selectable Hardware & Software Features
- Universal Viscosity Curve (UVC) and API Eq.
- Advanced Batching Features: Overrun Compensation, Autobatch Start, Print End of Batch, Slow Fill, 2 Stage Batching
- Isolated Outputs Standard
- RS-232 Port Standard, RS-485 Optional  
Advanced Printing Capabilities  
Windows™ Setup Software
- On Board Data Logging
- DDE Server & HMI Software Available
- Enhanced Modem Features for Remote Metering
- Quick Batching Sequence with Automatic Ticket Printing



## Description:

The MS-716 is a special version of the SUPERtrol-1 Flow Computer which is supplied in a vehicle mount enclosure. The MS-716 satisfies the instrument requirements for a variety of flowmeter types in liquid applications. Multiple flow equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported

The versatility of the MS-716 permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument.

The isolated analog output can be chosen to follow volume flow, corrected volume flow, mass flow, temperature, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data logging, transaction printing, or for connection to a modem for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs and printing system setup.

99792 05/07/05



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## Specifications:

### Flow Meters and Computations

Meter Types: All linear and square law meters supported including: Coriolis, vortex, turbine, magnetic, PD, target, orifice, venturi, v-cone and many others

Linearization: Square root, 16 point table or UVC table

Computations: Volume, Corrected Volume & Mass

Fluid Computations: Temperature, Density, Viscosity and API 2540 for petroleum.

### Environmental

Indoor Use

Altitude up to 2000m

Operating Temperature: 0°C to +50°C  
(-20°C to 55°C optional)

Storage Temperature: -40°C to +85 C

Maximum Relative Humidity : 80% for temperatures up to 31°C decreasing linearly to 50% RH at 40°C

Mains supply voltage fluctuations not to exceed  $\pm 10\%$  of the nominal voltage

Transient overvoltage according to INSTALLATION CATEGORY II (see UL 3101-1 Annex J)

POLLUTION DEGREE 2 in accordance with IEC 664 (see 3.7.3)

Materials: UL, CSA, VDE approved

UL Class 1 Division 2 (optional)

**Listing:** UL/ULC Listed (File No. E192404), CE Compliant

### Display

Type: 2 lines of 20 characters

Types: Backlit LCD

Character Size: 0.3" nominal

User programmable label descriptors and units of measure

### Keypad

Keypad Type: Membrane Keypad with 16 keys

### Enclosure

Size: See Dimensions

Seal: NEMA4X

Materials: Aluminum

### Real Time Clock

The MS-716 is equipped with a battery backed real time clock with display of time and date.

Format:

12 or 24 hour time display

Day, Month, Year date display

### Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power: 85 to 127 Vrms, 50/60 Hz

220 VAC Power: 170 to 276 Vrms, 50/60 Hz

DC Power:

12 VDC (10 to 14 VDC)

24 VDC (14 to 28 VDC)

Power Consumption:

AC: 11.0 VA (11W)

DC: 300 mA max.

### Flow Inputs:

#### Analog Input:

Accuracy: 0.01% FS at 20° C

Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Basic Measurement Resolution:

16 bit

Update Rate: 4 updates/sec

Automatic Fault detection: Signal over/under-range, Current Loop Broken

Calibration: Software Calibration (no trimmers) and Auto-zero Continuously

Extended calibration:

Learns Zero and Full Scale of each range using special test mode.

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit: 50 VDC Over voltage protection

Over-Current Protection: Internally current limited protected to 24VDC

#### Pulse Inputs:

Number of Flow Inputs: one with or without quadrature

Input Impedance: 10 K $\Omega$  nominal

Pullup Resistance: 10 K $\Omega$  to 5 VDC (menu selectable)

Pull Down Resistance: 10 K $\Omega$  to common

Trigger Level: (menu selectable)

High Level Input

Logic On: 3 to 30 VDC

Logic Off: 0 to 1 VDC

Low Level Input (mag pickup)

Sensitivity:

10 mV or 100 mV

Minimum Count Speed:

Menu selectable

Maximum Count Speed:

Menu Selectable: 40Hz, 3000Hz or 20 kHz

Overvoltage Protection: 50 VDC

### Auxiliary / Compensation Input

The auxiliary/compensation input is menu selectable for temperature, density or not used. This input is used for the compensated input when performing compensated flow calculations and using volumetric flowmeters. It can also be used as a general purpose input for display and alarming.

Operation: Ratiometric

Accuracy: 0.01% FS at 20° C

Basic Measurement Resolution: 16 bit

Update Rate: 1 update/sec minimum

Automatic Fault detection:

Signal Over-range/under-range

Current Loop Broken

RTD short

RTD open

Fault mode to user defined default settings

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit (Voltage Input): 50 VDC

Available Input Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

100 Ohm DIN RTD

(DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

1 mA Excitation current with reverse polarity protection

Temperature Resolution: 0.01 C

### Control Inputs

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.

Control Input Specifications

Input Scan Rate: 10 scans per second

Logic 1: 4 - 30 VDC

Logic 0: 0 - 0.8 VDC

Input Impedance: 100 KΩ

Control Activation:

Positive Edge or Pos. Level based on product definition for switch usage.

### Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected)

**NOTE:** DC powered units have limited excitation voltage

### Relay Outputs

The relay outputs are menu assignable to (Individually for each relay) Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm or General purpose warning (security), low temperature/high temperature.

Number of relays: 2 (4 optional)

Contact Style: Form C contacts

Contact Ratings: 5 amp, 240 VAC or 30 VDC

### Serial Communication

The serial port can be used for printing, datalogging, modem connection and communication with a computer.

RS-232:

Device ID: 01-99

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Handshaking: None, Software, Hardware

Print Setup: Configurable print list and formatting.

Print Out: Custom form length, print headers, print list.

Print Initialization: Print on end of batch, key depression, interval, time of day or remote request.

RS-485: (optional 2nd COM port)

Device ID: 01-247

Baud Rates: 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

### Data Logging

The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

### Isolated Analog Output

The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Volume Total, Corrected Volume Total or Mass Total.

Type: Isolated Current Sourcing

Available Ranges: 4-20 mA, 0-20 mA

Resolution: 12 bit

Accuracy: 0.05% FS at 20° C

Update Rate: 1 update/sec minimum

Temperature Drift: Less than 200 ppm/C

Maximum Load: 1000 ohms (at nominal line voltage)

Compliance Effect: Less than .05% Span

60 Hz rejection: 40 dB minimum

Calibration: Operator assisted Learn Mode

Averaging: User entry of damping constant to cause a smooth control action

**NOTE:** DC powered units are not isolated

### Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total

Pulse Output Form: Photomos Relay

Maximum On Current: 25 mA

Maximum Off Voltage: 30 VDC

Saturation Voltage: 1.0 VDC

Maximum Off Current: 0.1 mA

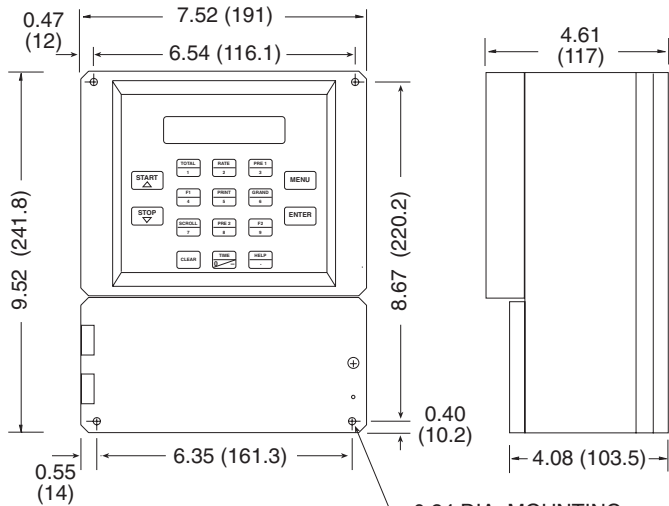
Pulse Duration: 10 mSec or 100 mSec (user selectable)

Pulse output buffer: 256

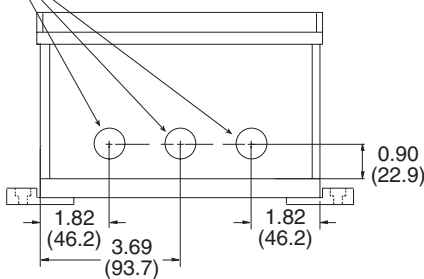
Fault Protection

Reverse polarity: Shunt Diode

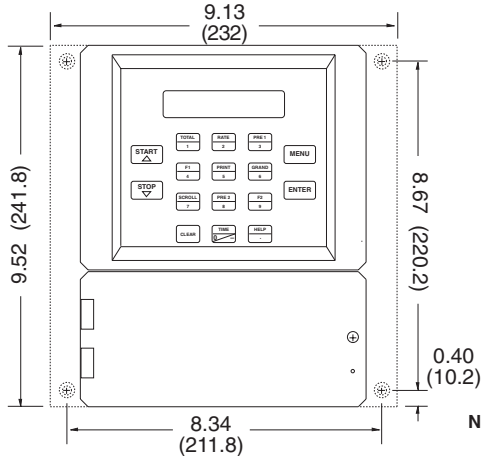
## Vehicle Mount Dimensions



0.875 DIA. CONDUIT ENTRY 3 PLACES  
0.24 DIA. MOUNTING THRU HOLE (4 PLACES)



**Optional Mounting Bracket (MB)**



**NOTE:** All dimensions are in inches (mm)

## Terminal Designations

1	DC OUTPUT		
2	PULSE IN 1	Vin +	FLOW
3	PULSE IN 2	lin +	IN
4	COMMON		
5	*****	Vin +	COMP
6	RTD EXCIT +		IN
7	RTD SENS +		
8	RTD SENS -	lin +	
9	CNTR IN 1		
10	CNTR IN 2		SEE USER
11	CNTR IN 3		MANUAL
12	COMMON		
13	PULSE OUTPUT +		
14	PULSE OUTPUT -		
15	ANALOG OUTPUT +	4-20 mA	
16	ANALOG OUTPUT -		
17	NC	25	NC
18	COM RLY1	26	COM RLY3
19	NO	27	NO
20	NC	28	NC
21	COM RLY2	29	COM RLY4
22	NO	30	NO
23	AC LINE	DC +	POWER IN
24	AC LINE	DC -	

## Ordering Information

**Example MS716 L 1 A 0 V ETMB**

Series: \_\_\_\_\_

**MS716 = ST1 Special**

Display Type: \_\_\_\_\_

**L = LCD**

Input Type: \_\_\_\_\_

**1 = 110 VAC**

**2 = 220 VAC**

**3 = 12 VDC (10 to 14 VDC)**

**4 = 24 VDC (14 to 28 VDC)**

Relays: \_\_\_\_\_

**A = 2 SPDT Relays**

**B = 4 SPDT Relays**

Network Card: \_\_\_\_\_

**0 = None (STD)**

**2 = RS485/Modbus**

Mounting: \_\_\_\_\_

**V = Vehical Mount, Skid Mount, Field Mount**

Options: \_\_\_\_\_

**ET = Extended Tempertaure**

**-4°F to 131°F (-20°C to 55°C)**

**UL = UL Class 1 Division 2**

**MB = Aluminum Mounting Brackets (2) (Recommended)**

**IM = IM-2400 Internal Modem**

**M = Modem Power Option**

**TB = RS485 Terminal Block**

**for Panel Mount Enclosure**

Accessories:

KEPS-KEP1-32

KEP RS232 for SUPERtrol 1, SUPERtrol 1LE,

SUPERtrol 2 and LEVELtrol 2 • 32 Bit OPC/DDE Server

KEPS-MBS32

Supports RS485 for ST1, ST1LE, ST2,

LT2, MRT, DRT & MB2 (Modbus RTU)

Modem Available, see MPP-2400 and MPP-2400N

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Remote metering and data collection software available, see TROLLink