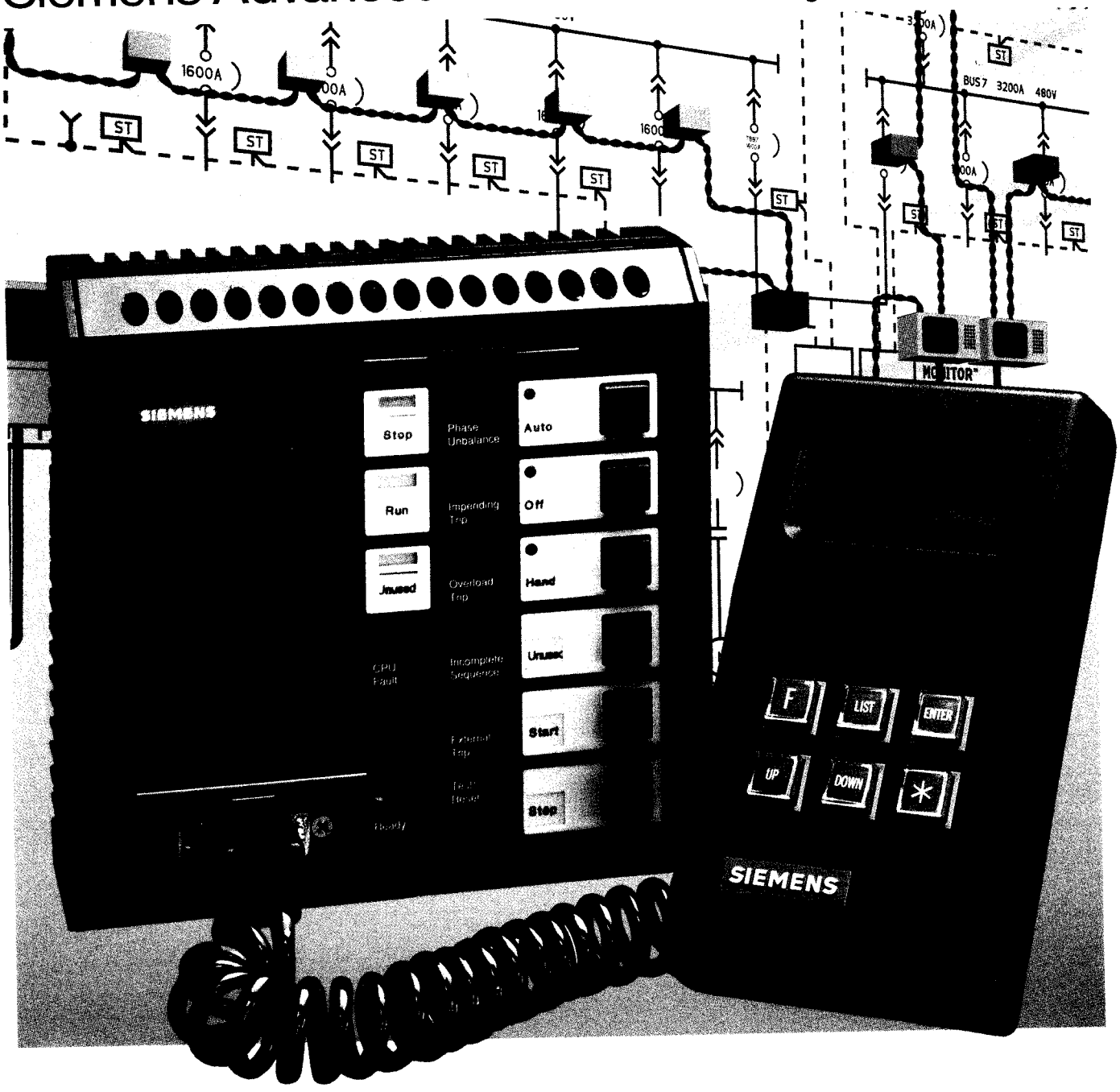
SIEMENS

SAMMS™

Siemens Advanced Motor Master System



Extend motor life with Siemens Advanced Motor Master System.

When a motor dies young, you lose more than just the motor. You lose time. A little time can mean a lot of money.

Why risk downtime on premature burnouts? Now you can significantly enhance the protection of your motors. Siemens Advanced Motor Master System – SAMMS – is a major advancement in motor protection technology.

SAMMS is a UL recognized user-programmable motor control and protection device. A selection of three models provides reliable, flexible, affordable protection for all NEMA/EEMAC-size low-voltage motors, from .3 to 540 amps.

A compact system with programmable control logic, SAMMS can replace a maze of timers, control relays, pushbuttons, selector switches, and pilot lights. The system consists of a current transformer and a control power transformer with a 12V secondary, a microprocessor-based controller and a hand-held communicator.

With SAMMS, you get advanced motor protection, fast installation, real-time metering, visual diagnostics, early alert and communications capabilities. Without SAMMS, you get more motor failures, more downtime, and wasted manpower.

Advanced protection, accurate to +/- 5%.

SAMMS' motor model continuously calculates the winding temperature based on the motor RMS current and the motor cooling and heating time constants.

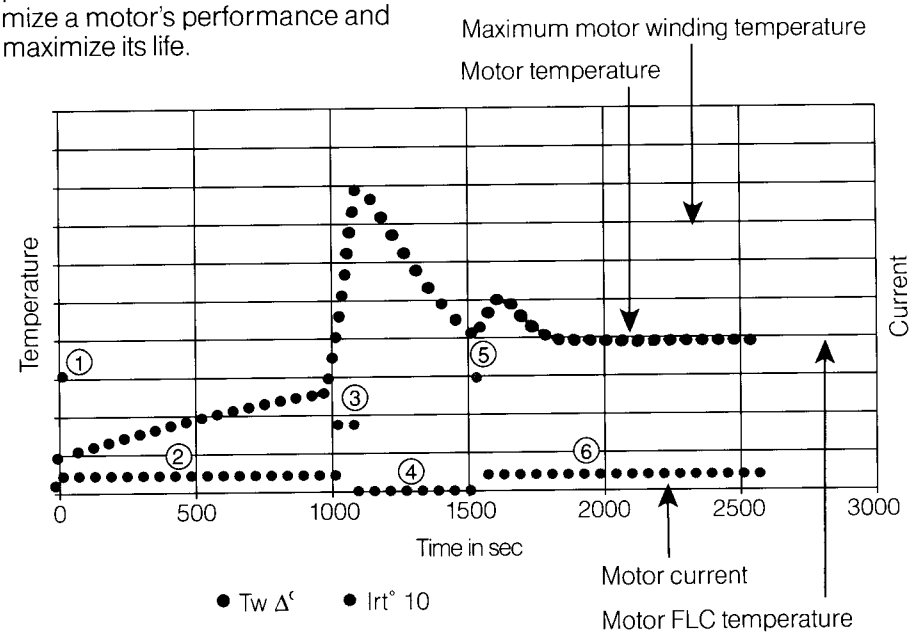
The model also offers a selection of class 2 through class 23 overload protection curves, allowing SAMMS to precisely match a motor's characteristics. Combined with the temperature emulation feature, this eliminates nuisance tripping and reduces exposure to excessive temperatures. So your motors perform better – and last longer. SAMMS is packed with other innovations to optimize a motor's performance and maximize its life.

Examples:

Overload protection accuracy of +/- 5%, a vast improvement of conventional methods, allows more precise sizing of motors to loads.

Motor starts are inhibited until the motor has cooled to a safe temperature – yet the start inhibit can be overridden in emergencies if desired using the hand-held communicator.

SAMMS detects jams, loss of load, phase loss or unbalance, and provides process current warning. Depending on the condition and its magnitude, SAMMS will provide advance warning or shut down the motor.



The arc furnace, (opposite page) where temperatures can reach 3100°F, is served by a motor utilizing SAMMS control. To work in this environment, SAMMS must be immune to severe electromagnetic and radio interference.

Motor Condition	Current	Temperature
1) Starting	Inrush current	Rapid temperature rise
2) Running	Running current	Slow increase to steady state running temperature
3) Overload trip	Rapid rise in current	Rapid temperature rise
4) Tripped	None	Slow cooling
5) Starting	Inrush current	Rapid temperature rise
6) Running	Running current	Slow decrease to steady state running temperature

Complex control made simple.

SAMMS is smart. It features a built-in microprocessor to replace over 34 conventional devices, such as timers, overload relays, push-buttons and selector switches. Less clutter means maintenance is much easier.

Installation is simplified, too. And you'll enjoy superb flexibility. With SAMMS' programmable logic control, custom-designed control circuits can be loaded into the microprocessor's memory—at the factory or on site. In fact, Siemens already has an extensive library of control circuits ready to meet your motor control requirements.

If your requirements change, the program can be changed. There's no reordering delays, rewiring errors, or changing heater coils.

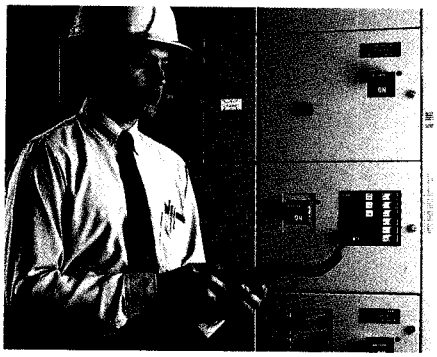
With optional software you can develop your own highly specialized circuits or modify existing ones. The IBM-compatible package is remarkably powerful and user-friendly. No special training is required.

SAMMS can accept four remote inputs and is compatible with all PLCs having a 120-volt input signal. The unit's front panel can be configured for remote or local control.

Trouble Shooting in a flash

Eight diagnostic LEDs provide visual indication of these conditions:

- Current Phase Unbalance LED flashes between 20 and 40% current unbalance. Remains ON at greater than 40% current unbalance.
- Impending Trip LED flashes between 100 and 110% of full load current. Remains ON at greater than 110% of full load current.



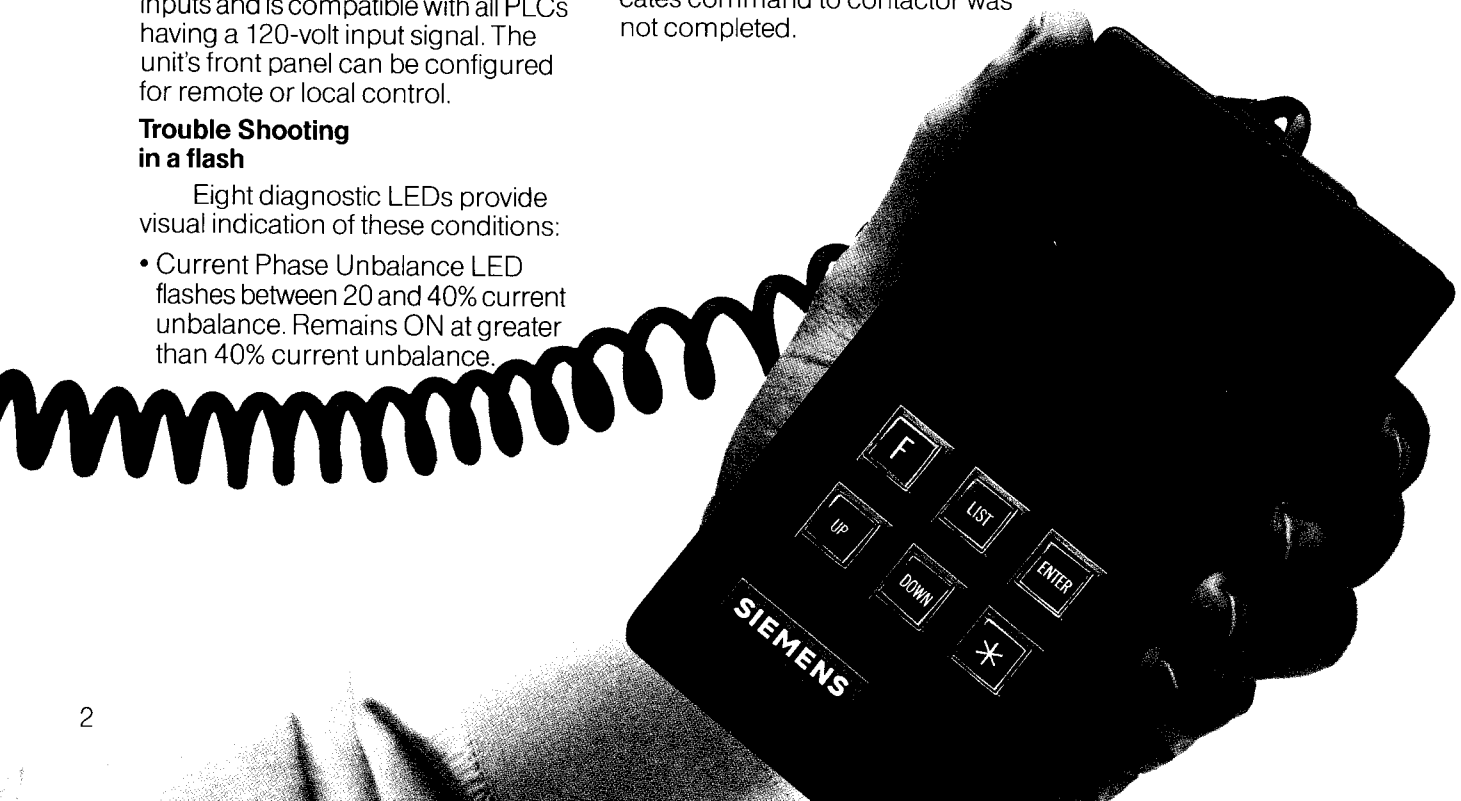
- Overload Trip LED flashes when overload reset is prohibited. Remains ON after an overload trip.
- External Trip LED flashes for loss of load warning or process current warning. Remains ON for mechanical jam trip or loss of load trip.
- CPU Fault LED indicates CPU fault condition or low voltage.
- Ready LED remains ON when control power is available.
- Incomplete Sequence LED indicates command to contactor was not completed.
- Ground Fault LED flashes for ground fault warning. Remains ON for ground fault protection. Remains OFF if ground fault option is not purchased.

How to get your motors in hand.

SAMMS' hand-held communicator provides access to 25 motor control and protection functions. The hand-held communicator can be used any time by your technician to enter changes to the motor data functions.

Virtually no special training is needed to use the hand-held communicator. Removing the unit after loading SAMMS with data assures security of motor settings.

SAMMS also stores statistical information in the microprocessor's memory. With the hand-held communicator, you can access a motor's elapsed running time, number of starts and number of overload trips. This statistical motor data permits more effective preventive maintenance and scheduling of downtime.



Two-way communications.

SAMMS can be an integral part of ACCESS, an open-protocol local area network. ACCESS links electrical metering and protection devices with the Host PC computer. The result is an electrical distribution communication system that monitors your entire facility.

Through ACCESS, SAMMS can receive and send data to other devices, such as a power monitor panel, a local display or a host computer. This means you can monitor and control motors from any centralized location.

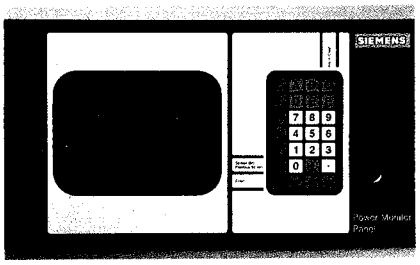
Your choice of three models.

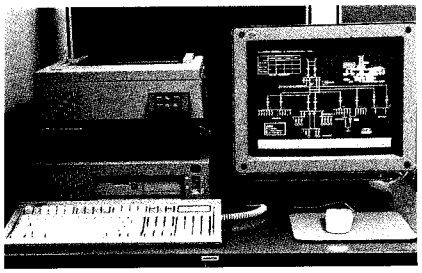
SAMMS 1 provides plenty of motor protection at an affordable price. This model's ease of installation and special features make it a competitive value.

SAMMS 2 combines motor diagnostics for preventive maintenance programs with the protection features necessary for long motor life.

SAMMS 3 has advanced features designed for critical applications where downtime causes unacceptable losses.

Whichever model you select, you'll have the flexibility to make last-minute adjustments, because SAMMS can be reprogrammed on line in just a few minutes.





Function	SAMMS 3	SAMMS 2	SAMMS 1
F1 Control circuit number	X	X	X
F2 NEMA size	X	X	X
F3 NEMA size for low speeds	X	X	X
F4 Full load current for OLR No. 1	X	X	X
F5 Full load current for OLR No. 2	X	X	X
F6 Service factor	X	X	X
F7 Overload trip class	X (1)	X (2)	X (3)
F8 Automatic reset	X	X	X
F9 Phase unbalance	X	X	X
F10 Time to restart	X	X	X
F11 Allow restart	X	X	X
F12 Ground fault protection	X (6)	X (6)	X (6)
F13 Timer No. 1	X	X	
F14 Timer No. 2	X	X	
F15 Motor Current	X (4)	X (5)	
F16 Trip current	X	X	
F17 Percentage unbalance current	X	X	
F18 Total elapsed time on motor	X	X	
F19 Total number of starts	X	X	
F20 Number of overload trips	X	X	
F21 Reset motor data	X	X	
F22 Set process current warning	X		
F23 Jam protection	X		
F24 Loss of load warning	X		
F25 Calculated motor winding temperature	X		

(1) Choice of Class 2 thru 23 protection
(2) Choice of Classes 5, 10, 15, 20 protection
(3) Choice of Class 10 or 20 protection
(4) Displays average phase current or any of the three phases
(5) Displays the average phase current
(6) Optional (disabled if not specified)

Guide Form Specification

The following specification can be added to the appropriate section of your motor control equipment specifications to guarantee that important features and functions of SAMMS are provided.

Each motor controller shall be provided with a microprocessor-based motor control and protection device. Motor protection shall be based on the calculated temperature of the motor windings as a function of the motor RMS current and the motor cooling and heating time constants. The minimum acceptable accuracy level for overload protection shall be plus or minus 5% during motor starting and running conditions. The following motor protection features shall be provided:

- Eliminate nuisance tripping by allowing the maximum number of motor starts without damage to the motor insulation.
- Motor lockout on thermal overload trip.
- Phase loss and phase unbalance protection.
- Impending trip alarm.
- Choice of Class 10 or 20, (optional) Class 5, 10, 15 and 20, or (optional) Class 2 through 23 (in one second increments) overload protection curves to match the motor characteristics and provide stall protection.
- (Optional) Process current (load current) alarm.
- (Optional) Mechanical jam protection.
- (Optional) Undercurrent/loss of load protection or alarm.

The device shall offer programmable control logic. Local control devices such as timers, control relays, pushbuttons and selector switches are replaced by software and the standard pushbuttons and lights on the device control panel.

Diagnostic LEDs shall provide visual status of the condition of the controller and the motor including current phase unbalance, impending overload trip, overload trip, external trip, incomplete sequence, CPU failure, ready (control power) and (optional) ground fault. A reset/test button shall be provided to allow resetting and testing of the overload function as well as testing the control panel LEDs.

(Optional) Statistical motor data including the elapsed motor running time, number of starts and number of overload trips, are stored in the microprocessor's memory and are displayed using the hand-held communicator. The hand-held communicator can also be used as an amp meter to display the average phase current, or (optional) the average of all three-phase motor currents.

The following optional features shall be provided:

- Ground fault protection.
- Voltage interrupt ride through (up to one second).
- Include an IBM compatible software package to allow development of customized control circuit logic diagrams.
- Provisions for communications to a host computer or the power monitor panel using the ACCESS local area network.
- Overload alarm contact.

The microprocessor-based protection and control device shall be Siemens Advanced Motor Master System: (SAMMS 3) (SAMMS 2) (SAMMS 1) or engineer-approved equal.

SAMMS Technical Specifications

1. Current Ranges

Current Settings	Size
0.3- 1.5	1A
1.2- 6.0	1B
4.8- 24.0	1C
10.0- 36.0	2A
10.0- 45.0	2B
20.0- 90.0	3
40.0-135.0	4
80.0-270.0	5
160.0-540.0	6

2. Control Power Specifications

Unit powered by 12Vac (+10%/-15%) supply
Control circuit inputs and outputs are 120Vac (+10%/-15%)
Power requirements:
- 4VA

Frequency:
- 60 Hertz

3. Motor Controller Specifications

Inputs:
- 6 Pushbuttons
- 4 Remote inputs

Outputs:
- 3 Coil drivers
- 3 Light bars
- 1 Overload alarm
- Relay (optional)

Overload test button/reset button
Incomplete sequence confirmation time:
- 1 second

Software-configurable control devices.
Timers:
- 4

Timing range:
- 1–200 seconds (Timer 1 and 2)
- 1 second (Timer 3)
- 30 seconds (Timer 4)

Timer auxiliary contacts:
- Instantaneous contacts
- Timed contacts

Control relays:
- 8

Auxiliary contacts:
- Instantaneous contacts

Access local area network compatible
Loss of voltage ride-through time period:
- 900 milliseconds

RMS current sensing

4. Overload Specifications

Overload classes:
- 22 (Range: 2-23. 1 second increments)

Trip characteristics:
- Tripping time at 6 x I_{FLC} equals 95% (+5%, -10%) of the overload class
- Tripping at 1.5 x I_{FLC} within 2 minutes for warm condition for all classes
- Tripping threshold is 1.1 +/- 0.05 x I_{FLC} for motors with 1.00 service factors and 1.2 +/- 0.05 x I_{FLC} for motors with 1.15 service factors
- Tripping time at 1.15 x I_{FLC} ≤ 20 minutes

Mechanical jam protection:
- Sudden increase to twice the value of the motor running current and exceeding 200% of I_{FLC} in 350 milliseconds

Loss of load protection:
- Sudden decrease to 50% of motor running current in 350 milliseconds

Process current warning:
- Settable from 0 to 100% of I_{FLC}

Accuracy:
- +/- 5% of overload trip curve values

Phase unbalance protection:
- Response time: ≥1 second
- Shifted trip threshold value at 40% phase unbalance

Motor Size (FLC)	Trip threshold
0 to 2.5	1.1 x I_{FLC}
2.6 to 40.0	.9 x I_{FLC}
41.0 to 240.0	.8 x I_{FLC}
> 240.0	.7 x I_{FLC}

Equipment Ground Fault Protection
- Pickup time: 1 second
- Pickup current:

Size	Current
1A	1.5 amps
1B	5.0 amps
1C	5.0 amps
2A	10.0 amps
2B	10.0 amps
3	10.0 amps
4	10.0 amps
5	10.0 amps
6	20.0 amps

5. Statistical Data Display Specifications

Elapsed motor running time x 10 in hours
Range:
- 0.0 to 65,536 (655,360 hours)

Increments:
- 1 hour

Number of motor starts x 10
Range:
- 0.0 to 65,536 (655,360 starts)

Increments:
- 1 operation

Number of overload trips
Range:
- 0.0 to 9999

Increments:
- 1 trip

6. Dimensions

SAMMS – 6.25"W x 6.00"H x 2.125"D
Hand-held communicator – 3.15"W x 5.7"H x 1.375"D

7. Environments

Operating temperature range:
- -25 deg C to +70 deg C

Storage temperature:
- -40 deg C to +85 deg C

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