

MOTION SENSOR

MODEL 2000

- Available in both nonredundant and redundant systems
 - Nonredundant system provides two track, independent T1/T2 frequency operation
 - Redundant system provides single-track operation
- Poor shunting software is standard
- Except for the processor module, uses all standard 3000 GCP modules
- Programmable frequencies
- Fully automated calibration
- Programmable remote start operation
- Front panel UAX and Enable inputs
- Front panel terminals accommodate both four and six-wire operation



**Non-Redundant Model 2000 Motion Sensor
Part Number 80080**

Using the technological foundation of Safetran's Model 3000 Grade Crossing Predictor, the Model 2000 Motion Sensor offers circuitry and software proven in over a decade of service experience.

The Model 2000 Motion Sensor is available in two configurations: a nonredundant system (part number 80080) and a redundant system (part number 80090). The nonredundant system is designed for two-track installations and provides independent programming of transmit frequencies for track 1 and track 2. The redundant system is designed for use in single-track installations. The transmit frequencies for both systems are field programmable. By using an external automatic transfer timer unit (80024), two nonredundant units can also operate as a redundant system.

Both Model 2000 Motion Sensor units are equipped with Safetran's poor shunting detection software to ensure proper crossing operation in areas of light train traffic where the rails can become coated with a thin layer of rust.

With the exception of the processor module, the Model 2000 Motion Sensor uses all standard Model 3000 GCP modules. The Model 2000 Motion Sensor is equipped with a new 80224 processor module. Programming is greatly simplified and system calibration requires performing only a single automated setup procedure. The Model 2000 Motion Sensor is also programmable to operate from a remote location. Both the Enable and UAX input terminals are available for more complex applications. Remote six track wire operation is also available via front panel Arema terminals.

SPECIFICATIONS

Input:

Voltage	9.0-16.5 VDC; 12 VDC nominal
Current	Single-track system - 1.50 amps Two-track system - 2.3 amps Optional modules up to 0.65 amp each Maximum current - 2.95 amps

Transmitter Output Current: 250 mA nominal on medium power; up to 500 mA on high power; varies with frequency

Program Selection: Keystroke entry via keyboard/display - Program is displayed by LCD readout

Frequency Available Frequencies can be programmed between 45 and 999 Hz in 1 Hz increments. Independent frequencies can be programmed for track 1 and track 2 (non-redundant model only, part number 80080-XXX)

Frequency Stability: ± 0.01 percent

Island Frequencies Available The 80211 island module provides 2.14, 2.63, 3.24, 4.0, 4.9, 5.9, 7.1, 8.3, 10.0, 11.5, 13.2, 15.2, 17.5, and 20.2 kHz.

Island Circuit Length: Determined by island track wire connections - 120 feet (36 meters) minimum to 350 feet (106 meters) maximum

Relay Drive Outputs: 400 to 1,000-ohm load

Surge Protection: Built-in surge protection for track and battery connections. Requires only primary arresters and equalizers.

Diagnostics and Monitoring: Accomplished via two-line, 16-character, alphanumeric, liquid crystal display. Diagnostic information, application programming and train move data plus internal voltages are displayed.

Mounting: The 2000 MS can be wall, rack, or shelf mounted. All track, power, and slaving connections use standard Arema terminals.

Dimensions:

Model 2000 and 2000S2:
23 inches (58.4 cm) wide
11.34 inches (28.8 cm) deep
14.36 inches (36.5 cm) high

Weight: **Model 2000** (all modules in place)
22 pounds (9.9 kg) (approximate)

Temperature Range: -40 degrees F to +160 degrees F (-40 degrees C to +71 degrees C)

Operating Distance: Tables 1 and 2 indicate minimum and maximum bidirectional and unidirectional approach lengths, respectively, for each standard Safetran 2000 MS operating frequency with ballast resistances of 2, 4, and 6 ohms per 1,000 feet. Maximum operating distances for any given frequency are governed by ballast resistance conditions, increasing with higher ballast and decreasing with lower ballast. Minimum approach distances are determined by available system gain. The minimum approach distance figures indicate the shortest approach distance over which a given frequency will operate.

ORDERING INFORMATION

TABLE 1

Ballast resistance vs. approach length by frequency, bidirectional applications

2000 MS Operating Frequency (HZ)	Bidirectional Approach Length (Feet)					
	2 Ohms/1,000 Feet Distributed Ballast		4 Ohms/1,000 Feet Distributed Ballast		6 Ohms/1,000 Feet Distributed Ballast	
	Minimum*	Maximum	Minimum*	Maximum	Minimum*	Maximum
86	1000	5100	1000	7600	1000	9280
114	750	4300	750	6100	750	7448
156	600	3750	600	5200	600	6349
211	475	3200	475	4500	475	5494
285	400	2800	400	3900	400	4762
348	400	2500	400	3400	400	4151
430	400	2200	400	3100	400	3785
525	400	2050	400	2900	400	3541
645	400	1850	400	2600	400	3175
790	400	1650	400	2300	400	2808
970	400	1475	400	2025	400	2472

* Based on use of hardwire or wideband shunts

TABLE 2

Ballast resistance vs. approach length by frequency, unidirectional applications

2000 MS Operating Frequency (HZ)	Bidirectional Approach Length (Feet)					
	2 Ohms/1,000 Feet Distributed Ballast		4 Ohms/1,000 Feet Distributed Ballast		6 Ohms/1,000 Feet Distributed Ballast	
	Minimum*	Maximum	Minimum*	Maximum	Minimum*	Maximum
86	700	4200	700	5900	700	7080
114	525	3700	525	5300	525	6360
156	420	3200	420	4600	420	5520
211	400	2650	400	3900	400	4680
285	400	2150	400	3300	400	3960
348	400	1850	400	2850	400	3420
430	400	1650	400	2500	400	3000
525	400	1450	400	2150	400	2580
645	400	1250	400	1850	400	2220
790	400	1075	400	1550	400	1860
970	400	1000	400	1425	400	1710

* Based on use of hardwire or wideband shunts

ORDERING INFORMATION

MODEL 2000 MOTION SENSOR, NON-REDUNDANT SYSTEM

Description	Part Number
Basic Model 2000 MS, Single-Track Operation (non-redundant) Includes one (1) each of the following: Case, 80081, Intelligent Processor Island Module, 80211, Transceiver module, 80012, Relay Drive module, 80013, Processor module, 80224, Control Interface module, 80020	80080-001
Basic Model 2000 MS, Single-Track Operation (non-redundant) with Data Recorder Module, 80115**	80080-003
Basic Model 2000 MS, Single-Track Operation (non-redundant) with keyboard	80080-005
Basic Model 2000 MS, Single-Track Operation (non-redundant) with keyboard plus Data Recorder Module, 80115**	80080-007
Basic Model 2000 MS, Single-Track Operation (non-redundant) with Data Recorder Interface Module, 80255	80080-013
Basic Model 2000 MS, Single-Track Operation (non-redundant) with keyboard plus Data Recorder Interface Module, 80255	80080-017

Description	Part Number
Basic Model 2000 MS, Two-Track Operation (non-redundant) Includes the following: Case, 80081 (1), Intelligent Processor Island Module, 80211 (2) Transceiver module, 80012 (2) Relay Drive module, 80013 (1) Processor module, 80224 (1), Control Interface module, 80020 (1)	80080-002
Basic Model 2000 MS, Two-Track Operation (non-redundant) with Data Recorder Module, 80115**	80080-004
Basic Model 2000 MS, Two-Track Operation (non-redundant) with keyboard	80080-006
Basic Model 2000 MS, Two-Track Operation (non-redundant) with keyboard plus Data Recorder Module, 80115**	80080-008
Basic Model 2000 MS, Two-Track Operation (non-redundant) with Data Recorder Interface Module, 80255	80080-014
Basic Model 2000 MS, Two-Track Operation (non-redundant) with keyboard plus Data Recorder Interface Module, 80255	80080-018

MODEL 2000S2 MOTION SENSOR, REDUNDANT SYSTEM

Description	Part Number
Basic Model 2000 MS, Single-Track Operation (redundant) Includes the following: Case, 80081 (1), Intelligent Processor Island Module, 80211 (2), Transceiver module, 80012 (2), Relay Drive module, 80013 (2), Processor module, 80224 (2), Control Interface module, 80020(1), Transfer module, 80028 (1)	80090-001
Basic Model 2000 MS, Single-Track Operation (redundant) with Data Recorder Module, 80115 (2)**	80090-002
Basic Model 2000 MS, Single-Track Operation (redundant) with keyboard (1)	80090-003
Basic Model 2000 MS, Single-Track Operation (redundant) with keyboard plus Data Recorder Module, 80115 (2) **	80090-004
Basic Model 2000 MS, Single-Track Operation (redundant) with Data Recorder Interface Module, 80255 (2)	80090-012
Basic Model 2000 MS, Single-Track Operation (non-redundant) with keyboard plus Data Recorder Interface Module, 80255 (2)	80090-014

** To record external relay functions, an 80025 Recorder Interface unit is required.