

# Y - 200 SERIES

## Four Channel Rack Mount Detector



Y-200

Y/2-200

With Audible Detect Signal

- Meets and exceeds NEMA TS 2 specification
- Six front panel DIP switches for each channel provide:
  - Seven levels of sensitivity plus off
  - Presence or Pulse mode
  - Four loop frequencies
- Loops are sequentially scanned to eliminate crosstalk
- Channel status outputs provide individual channel status states per NEMA TS 2
- Loop Fail Event Monitor remembers and indicates intermittent and current loop failure
- Detector is self tuning and provides complete environmental tracking
- Dual color, high intensity, LEDs (one per channel):
  - Green indicates detect
  - Red indicates loop fail
- Complete built-in detector integrity test
- Space provided on front panel to label each channel
- Audible detect signal (buzzer) facilitates loop and/or detector troubleshooting

### Ordering Information:

**Model Y-200-SS** Four-channel, 2.00" wide (double width) detector with Solid State outputs  
**Model Y/2-200-SS** Four-channel, 1.12" wide (single width) detector with Solid State outputs

The Model Y-200 series is designed to meet or exceed NEMA Standards TS 2-1998 for Type B detectors and is downward compatible to NEMA Standards TS 1-1989. Model Y-200 detectors are four channel, card rack type loop detectors with individual channel detect and loop fail indications provided via four dual color, high intensity LEDs.

# Y-200 Series Specifications

This is a Performance Specification. It is not intended to be used as Operating Instructions.

**Loop Frequency:** Each channel has four (4) loop frequencies (normally in the range of 20 to 100 kilohertz) that are selectable by means of eight front panel mounted DIP switches (two per channel). The actual loop operating frequency is a function of the loop / lead-in network and the components of the loop oscillator circuit.

**Sensitivity:** Seven (7) sensitivity levels (plus off) are available for each channel. The eight settings are selectable by means of twelve front panel mounted DIP switches (three per channel). Each of the seven sensitivity levels are binary encoded from 1 to 7 (lowest to highest sensitivity). A setting of 0 turns the channel off. The sensitivity level selected determines the percentage of negative inductance change of the loop circuit required for a Call output signal. (See SENSITIVITY, -ΔL/L, & RESPONSE TIME table.)

**Presence / Pulse Mode:** Each channel has a front panel mounted DIP switch that can be used to configure the channel to operate in one of two modes.

**Presence Mode:** Call hold time is a minimum of four minutes regardless of vehicle size, and is typically one to three hours for an automobile or truck.

**Pulse Mode:** A pulse of 125 ±10 milliseconds duration is generated for each vehicle entering the loop detection zone. Each vehicle detected is instantly tuned out if it remains in the loop detection zone longer than two seconds. This feature allows detection of vehicles subsequently entering the detection zone. After each vehicle leaves the loop detection zone, the channel resumes full detection sensitivity within one second. Changing the Presence / Pulse Mode switch will reset the channel.

**Noise Filter On / Off:** A PC board mounted DIP switch controls the Noise Filter feature. When the Filter feature is ON, a time filter is added before the output signal is activated when a vehicle is in the loop detection area. It is strongly recommended that the Filter feature be set to ON for most traffic control applications.

**TS 2 Channel Off Status:** A PC board mounted DIP switch (labeled 100 MS) controls the state of the detector's TS 2 Channel Status outputs when a channel is turned OFF. When the DIP switch is turned OFF, turning a channel OFF will cause that channel's TS 2 channel status output to maintain State 1 (Normal Operation / Detector Channel OK). When the DIP switch is turned ON, turning a channel OFF will cause that channel's TS 2 channel status output to enter State 2 (Detector Channel Failure).

**Fail-Safe / Fail-Secure Operation:** During a loop failure condition, the state of a channel's output can be selected as Call in Fail-Safe mode or No Call in Fail-Secure mode. This is accomplished via four PC board mounted DIP switches. Operation in Fail-Safe mode during a loop failure is the generally accepted mode of operation for intersection control. Operation in Fail-Secure mode during a loop failure is typically used in incident detection systems used for freeway management. Changing a channel's Fail Safe / Fail Secure setting will reset the channel.

**Audible Detect Signal:** A front panel mounted push-button is used to enable an audible detect signal that is emitted any time a channel's detection zone is occupied.

**Detect / Fail Indicator:** Each channel has a super bright, high intensity, dual color (Red / Green) LED which indicates a Call output and / or the status of any current or prior loop fault condition for that channel. A green indication signifies a Call output (detect state). A red indication signifies a loop failure condition. A continuous ON (green) state indicates a Call output. A continuous ON (red) state indicates that a current open loop failure condition or an inductance change condition of greater than + 25% condition exists. When operating in Fail-Safe mode, this indication is also generates a Call output. When operating in Fail-Secure mode, no Call output is generated. A 1 Hz (red) flash rate indicates that a current shorted loop failure condition or an inductance change condition of greater than - 25% condition exists. When operating in Fail-Safe mode, this indication is also generates a Call output. When operating in Fail-Secure mode, no Call output is generated. A flash rate of three 50 millisecond (red) pulses indicates a prior loop failure condition. A flash rate of three 50 millisecond (red) pulses followed by a 750 millisecond (green) pulse indicates a prior loop failure condition and a current Call output (detect state).

**Loop Fail (Event) Monitor:** If the total inductance of the loop input network goes out of the range specified for the detector, or rapidly changes by more than ±25%, the affected channel will immediately enter the programmed Fail-Safe or Fail-Secure mode of operation. Fail-Safe operation generates a continuous Call output in the Presence or Pulse mode. Fail-secure operation does not generate a Call output during a loop failure. In both modes of operation, the Detect / Fail LED will illuminate and remain on for as long as the loop fault exists. If the loop self-heals, the channel will resume operation in a normal manner, but the Detect / Fail LED of the channel will begin to flash at a rate of three flashes per second as a means of indicating a prior Loop Fail condition. The Detect / Fail LED will continue its indication of a prior loop failure until the detector channel is reset or the detector is manually reset.

**Loop Inductance Range:** 20 to 2000 microhenries with a Q factor of 5 or greater.

**Loop Feeder Length:** Up to 5000 feet (1500m) maximum with proper feeder cable and appropriate loops.

**Loop Input:** Transformer isolated. The minimum capacitance added by the detector is 0.068 microfarad. Scanning the Loop(s) connected to each detector channel are activated alternately to minimize crosstalk between adjacent loops connected to the same detector.

**Lightning Protection:** The detector can tolerate, without damage, a 10 microfarad capacitor charged to 2,000 volts being discharged directly into the loop input terminals, or a 10 microfarad capacitor charged to 2,000 volts being discharged between either loop terminal and earth (chassis) ground.

**Detector Reset:** Changing the position of any channel's DIP Switches (except the Frequency switches) will reset that detector channel. The detector can be reset by connecting a logic ground signal to Pin C (Reset Pin). Reapplication of power after a power loss will also cause the detector to reset. After changing any channel's Frequency selection switches (DIP Switches 1 & 2), the detector must be reset.

**Solid State Outputs:** Optically coupled transistors. 30 VDC maximum collector (drain) to emitter (source). 50 mA maximum saturation current. 2 VDC maximum transistor saturation voltage. The output transistors are protected by a 33 volt Zener diode connected between the collector (drain) and emitter (source).

**Response Time:** Meets or exceeds NEMATS 2 specifications. The response time of any channel is affected by the sensitivity level setting and Filter On / Off selection of that channel. (See SENSITIVITY, -ΔL/L, & RESPONSE TIME table.)

**Self Tuning:** The detector automatically self tunes and is operational within two seconds after application of power or after being reset. Full sensitivity and hold time requires 30 seconds of operation.

**Environmental & Tracking:** The detector is fully self-compensating for environmental changes and loop drift over the full temperature range and the entire loop inductance range.

**Grounded Loop Operation:** The loop isolation transformer allows operation with poor quality loops (which may include one short to ground at a single point).

**Detect Outputs:** Per NEMATS 2, conduction indicates detection output. The output is conductive in a DC power supply failure condition or during a loop failure (i.e. An open loop or shorted loop condition).

**NEMATS 2 Status Outputs:** Meets and / or exceeds all NEMATS 2 status output specifications.

**Test Mode:** A PC board mounted DIP switch enables Test Mode. Test Mode provides a means of verifying proper operation of all of the detector's input and output circuitry including switches, LEDs, and outputs. Each channel's loop oscillator circuit is also checked to verify the correct frequency in each of the four frequency settings. The frequency portion of testing requires that each channel be connected to a 100 microhenry loop; if other inductance values are used, the frequency test results will be invalid.

**Power:** 10.8 to 30 VDC, 100 mA maximum.

**Circuit Board:** Printed circuit boards are 0.062 inch thick FR4 material with 2 oz. copper on both sides and plated through holes. Circuit boards and components are conformal coated with polyurethane.

**Operating Temperature:** -40° F to +180° F (-40° C to +82° C).

**Connector:** 2 x 22 contact edge card connector with 0.156 inch (0.396 cm.) contact centers. Key slots located between pins B/2 & C/3, E/5 & F/6, and M/11 & N/12. (See PIN ASSIGNMENTS table.)

**Size:** Y-200 (double width faceplate) - 4.50 inches (11.43 cm) high x 2.00 inches (5.08 cm) wide x 6.88 inches (17.46 cm) deep (including connector, excluding handle). Y/2-200 (single width faceplate) - 4.50 inches (11.43 cm) high x 1.12 inches (2.84 cm) wide x 6.88 inches (17.46 cm) deep (including connector, excluding handle). Handle adds 1.00 inch (2.54 cm) to depth measurement.

**Weight:** 6.0 oz (170 gm).

Sensitivity, -ΔL/L, & Response Time			
Sensitivity	-ΔL/L	Response Time	
		Noise Filter Off	Noise Filter On
0	N/A	N/A	N/A
1	0.64%	17 ±5 milliseconds	120 ±40 milliseconds
2	0.32%	17 ±5 milliseconds	120 ±40 milliseconds
3	0.16%	35 ±10 milliseconds	120 ±40 milliseconds
4	0.08%	50 ±15 milliseconds	120 ±40 milliseconds
5	0.04%	75 ±25 milliseconds	120 ±40 milliseconds
6	0.02%	120 ±40 milliseconds	120 ±40 milliseconds
7	0.01%	120 ±40 milliseconds	120 ±40 milliseconds

\* Denotes Factory Default

Note: Changing any of a channel's sensitivity switches will reset that channel. To achieve the exact response times listed above, the Sensitivity level and Fail-Safe / Fail-Secure settings for all four channels must be set the same.

Factory Default Settings Front Panel Mounted DIP Switches (All Channels)			
Switch	Function	Setting	Factory Default
1			OFF
2			OFF
3	Frequency	0	OFF
3	Presence / Pulse	Presence	ON
4			OFF
5			ON
6	Sensitivity	6	ON

Factory Default Settings PC Board Mounted DIP Switches			
Switch	Function	Setting	Factory Default
1	Test Mode	Test Mode OFF	OFF
2	TS 2 Channel Status (100 MS)	Normal Operation (Channel OK)	OFF
3	Noise Filter	Noise Filter ON	ON
4	Channel 1 Fail-Safe / Fail Secure	Fail Safe	OFF
5	Channel 2 Fail-Safe / Fail Secure	Fail Safe	ON
6	Channel 3 Fail-Safe / Fail Secure	Fail Safe	ON
7	Channel 4 Fail-Safe / Fail Secure	Fail Safe	ON
8	Spare	N/A	N/A

PIN Assignments			
PIN	Function	PIN	Function
A	DC (-) Common	1	No Connection
B	DC (+) Power	2	No Connection
C	Reset Input	3	No Connection
D	Channel 1 Loop Input	4	Channel 1 Loop Input
E	Channel 1 Loop Input	5	Channel 1 Loop Input
F	Channel 1 Output, Drain	6	No Connection
H	Channel 1 Output, Source	7	Channel 1 TS 2 Status Output
J	Channel 2 Loop Input	8	Channel 2 Loop Input
K	Channel 2 Loop Input	9	Channel 2 Loop Input
L	Chassis Ground	10	No Connection
M	No Connection	11	No Connection
N	No Connection	12	No Connection
P	Channel 3 Loop Input	13	Channel 3 Loop Input
R	Channel 3 Loop Input	14	Channel 3 Loop Input
S	Channel 3 Output, Drain	15	No Connection
T	Channel 3 Output, Source	16	Channel 3 TS 2 Status Output
U	Channel 4 Loop Input	17	Channel 4 Loop Input
V	Channel 4 Loop Input	18	Channel 4 Loop Input
W	Channel 2 Output, Drain	19	No Connection
X	Channel 2 Output, Source	20	Channel 2 TS 2 Status Output
Y	Channel 4 Output, Drain	21	No Connection
Z	Channel 4 Output, Source	22	Channel 4 TS 2 Status Output

