

## DESCRIPTION

The TC-CK1-VMS **INTERSECTOR™** is a microwave-based radar motion sensor used for intersection control. The unit interfaces with a traffic-control cabinet, and outputs signals when vehicles are present in user-defined zones. Zones are created using an X-Y coordinate system, and operation is verified and optimized using a laptop with a modern web browser (Google Chrome, FireFox, Microsoft Internet Explorer and Edge) as part of the installation process.

The TC-CK1-VMS allows users to create up to 8 detection zones and assign vehicle motion in these zones to up to 8 outputs to the control cabinet. Detection zones can be created to a maximum distance of 600 feet from the sensor itself.

Interface boards are available for the TC-CK1-VMS which are compatible with both NEMA, 170, 179, and 2070 cabinets. For each sensor, one interface board is required in order to communicate with the control cabinet. Three interface boards are available. The TCIB-2.1 provides 2 outputs and uses a single slot in the cabinet. The TCIB-4.1 provides 4 outputs and uses a single slot, and TCIB-4.2 provides 4 outputs and utilizes two slots in the cabinet.

## BENEFITS

The TC-CK1-VMS brings the advantages of microwave radar detection together with motion-tracking capabilities in an easy-to-understand visual image. The TC-CK1-VMS offers these advantages when compared to cameras or loops:

- ☑ Detection not affected by weather\*
- ☑ Immune to sunrise/sunset or post-rain glare
- ☑ Not susceptible to in-road breakage
- ☑ Multiple lanes covered by a single unit
- ☑ Easily installs to corner pole & signal mast arm
- ☑ Surge protection provided in detector
- ☑ Successfully detects bicycles/motorcycles/vehicles
- ☑ Significant cost savings when compared to advance detection loops
- ☑ No privacy concerns

The TC-CK1-VMS allows users to:

- ☑ Graphically track vehicles as they approach the intersection
- ☑ Easily set up detection zones to provide programmable inputs to a control cabinet
- ☑ Verify that the system is functioning correctly and troubleshoot

\*up to 2 in/hour of rain

TC-CK1-VMSv012018

**SENSOR SPECIFICATIONS****PHYSICAL:**

- ☑ Size: 10.5x8.5x7 (LxWxH)
- ☑ Weight: 5 pounds
- ☑ Color: White body with gray endcaps
- ☑ Universal Mounting Bracket included

**OPERATING:**

- ☑ Temperature range: -40°C to +85°C
- ☑ Power requirements: Powered from TCIB over Ethernet cable

**RADAR:**

- ☑ Seven selectable frequency channels at 24 GHz
- ☑ Beam angle: Azimuth  $\pm 15$  degrees out to 600'
- ☑ Elevation: 12 degrees
- ☑ Operates with FSK-4 mode

**PERFORMANCE:**

- ☑ Track multiple moving and stationary vehicles
- ☑ Tracking of X and Y location of each vehicle
- ☑ Updates 20 times per second
- ☑ Speed of each vehicle is shown for reference
- ☑ Motion detection—60 feet minimum to 600 feet maximum
- ☑ Mounting height 14 to 20 feet\*—Mounting outside this range may reduce performance (See Installation Table)
- ☑ Mounting location—corner signal pole, or on mast arm no further than 10 feet from signal pole—Maximum  $\pm 15$  degrees offset from traffic direction—Mounting outside this range may reduce performance
- ☑ Ethernet interface with power supplied over the Ethernet (POE)—Maximum distance 300'—For longer distances, consult factory
- ☑ Eight programmable independent zones
- ☑ Eight Opto-isolated outputs
- ☑ Grid tracking with live interactive zones
- ☑ Simulation mode for demonstration

- ☑ Provides histograms to verify setup of zones
- ☑ Selectable standard (English) or metric units
- ☑ User-defined delay and extension time for each zone
- ☑ Operational from cold start in 20 seconds—Full performance in 1 minute
- ☑ Automatically recovers from power failure
- ☑ FCC and IC approved
- ☑ IP addressable for remote set-up and monitoring
- ☑ Optional bicycle-only setting for detection zones
- ☑ Surge protection provided in detector

**WARRANTY**

A 3 year warranty is available from the manufacturer covering defects in materials and workmanship. Contact MS SEDCO for details.

\* If the TC-CK1-VMS is mounted over active roadway, make sure bottom of sensor has adequate clearance for state and local requirements.

The TC-CK1-VMS is a forward-looking motion zone radar detection system. It has high reliability of an above ground, non-intrusive radar detection. TC-CK1-VMS interfaces to MS Sedco TCIB, a standard rack detector interface card. TC-CK1-VMS can track individual vehicles by lane across a wide range of temperature and climate conditions.

TABLE 1: TC-CK1-VMS Performance: Detection Performance

Parameter	Value	Unit
Max Range for Pedestrian	160	Feet
Max Range for Passenger Car	600	Feet
Min Range	50	Feet
Number of Detection Lanes: >100 ft	4	Lanes
Number of Detection Lanes: 80-100 ft	3	Lanes
Number of Detection Lanes: 60-80 ft	2	Lanes
Radar Field of View: Azimuth	±15	Degrees
Max Offset Angle	±15	Degrees
Range Accuracy	Typical < ±2.5% or < ±2 ft	Greater of
Radar Channels	7	Unique Channels
Motion Detection Range	60 to 600	Feet
Typical Mounting Height	Typical 14 to 20	Feet
Mounting Location	Rigid Location	Metal Pole or Mast Arm
Tilt Angle: Detection Start = 60-100 ft.	-6	Degrees
Tilt Angle: Detection Start = 100-120 ft.	-4	Degrees
Tilt Angle: Detection Start = 120-160 ft.	-2	Degrees
Tilt Angle: Detection Start < 160 ft.	0	Degrees
Radar Field of View: Elevation	12	Degrees
Radar Speed Range	± (0.2 to 150)	Miles-Per-Hour
Radar Speed Accuracy	Typical < ±2 MPH or ±2%	Greater of
Radar Update Rate	<50	Milli-Seconds
Tracking Initialization Time	<0.5	Seconds
New Object Validation Distance	60	Feet, Minimum

FIGURE 1: TC-CK1-VMS Installation Example

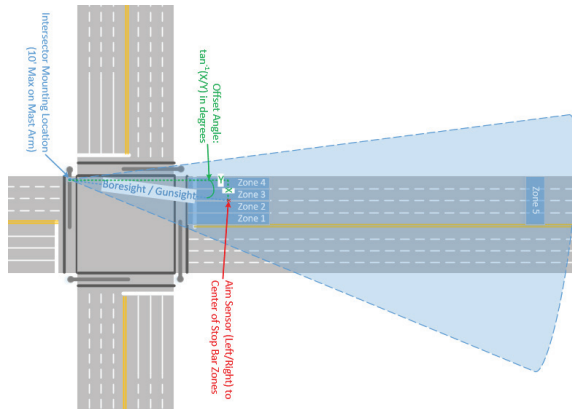


FIGURE 2: Recommended TC-CK1-VMS Mounting Location Depiction

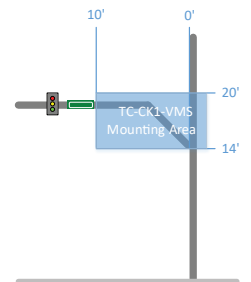


FIGURE 3: TC-CK1-VMS Tilt and Elevation Angle

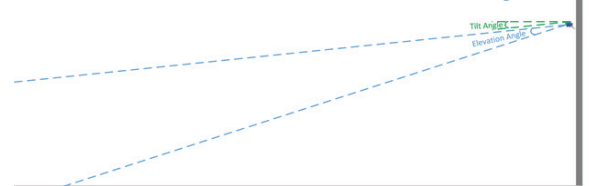
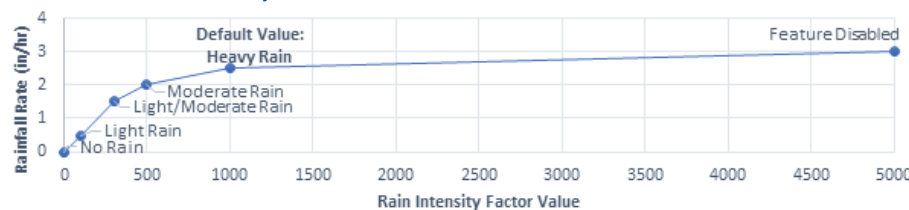


FIGURE 4: Rain Intensity Factor Correlated to Rainfall Rate



**TABLE 2: TC-CK1-VMS Performance: Available Software Features**

Parameter	Value	Unit
Simultaneous Tracked Objects	Up to 64	Objects
Simultaneous Displayed Objects	Up to 32	Objects
Adjustable Zones	8	Per TC-CK1-VMS
Outputs	Up to 8	With Secondary Card
Counts	Loop from 0 to 65,535	By Zone
Adjustable Min and Max Speed Bins	Adjustable 0 to ±150 MPH	By Zone
Direction of Detection	Approach or Depart	Movement Relative to Sensor
Number System	Metric and English	Units
Web Interface	Chrome, IE, Edge, Firefox	Browsers (latest version)
Simulate Car Length	Point / Extend	By Zone
Adjustable Rain Threshold	Yes	From mist to extremely heavy
Adjustable Bike Classification Sensitivity	Yes	Adjustable Car / Bike decision threshold
Product Software Upgradable	Yes	Via Bootloader program

**TABLE 3: TC-CK1-VMS Performance: Environmental Performance**

Parameter	Value	Unit
NEMA TS2 2003	Pass	Appropriate sections
Temperature	-40 to +85	Degrees C
Shock	10	G's
Vibration	±0.5	G's
IP Rating	54	
Conformal Coating	Yes	

**TABLE 5: TC-CK1-VMS Performance: General Parameters**

Parameter	Value	Unit
Interface	100Base-T	Ethernet with power
IP Address	Yes	Configurable
MAC Address	Yes	Set at factory
Power Requirements: TC-CK1 Only	6.4	Watts
Power Requirements: System	8.8	Watts
Input Voltage Requirements	24	Volts - DC, Power over Ethernet
Preventative Maintenance	None required	When installed
Radio Frequency	24.000 to 24.250	GHz
Max Transmit Power (EIRP)	20	dBm
Startup Time	1	Minute
Regulatory	FCC and IC	FCC part 15.245 Canadian Standards: - RSS-210

**TABLE 6: RF Channel to Radio Frequency Map**

RF Channel	Frequency (GHz)
1	24.0810
2	24.0935
3	24.1060
4	24.1185
5	24.1310
6	24.1435
7	24.1560

**TABLE 7: Tilt Angle Matrix**

Mount Height	60	70	80	90	100	110+
14'	-6°	-3°	-1°	0°	0°	0°
15'	-7°	-4°	-1°	0°	0°	0°
16'	-8°	-5°	-2°	-1°	0°	0°
17'	-9°	-6°	-3°	-1°	0°	0°
18'	N/A	-7°	-4°	-3°	0°	0°
19'	N/A	-8°	-5°	-3°	-1°	0°
20'	N/A	-8°	-6°	-3°	-2°	0°

**TABLE 8: Maximum Range Matrix**

Mount Height	60	70	80	90	100	110+
14'	133'	267'	600'	600'	600'	600'
15'	122'	215'	600'	600'	600'	600'
16'	114'	183'	458'	600'	600'	600'
17'	107'	162'	324'	600'	600'	600'
18'	N/A	147'	257'	515'	600'	600'
19'	N/A	135'	217'	363'	600'	600'
20'	N/A	142'	190'	382'	573'	600'