Equipment Catalog
Traffic Monitoring & Communications Equipment

Contract No. PC60689
Trichord, Inc.

Version 5.0 – March 2005

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Trichord is pleased to have been selected as a SmarTek Systems equipment vendor for the State of New York under contract #PC60689 – Traffic Monitoring & Communications Equipment. Our close professional relationship with SmarTek allows us to offer SmarTek expertise, coupled with Trichord support. Our traveler information experience allows us to offer systems integration assistance, in addition to an equipment procurement resource.

The Price List on the following pages reflects the discounted pricing for New York State, with shipping included. Following the price list, we provide product specification sheets for several system components.

Section 3 of the catalog outlines customized, bundled configurations that are available to New York State purchasers. Prices for these configurations are included in the price list. Trichord will continue to work closely with the State of New York to develop customized site solutions that meet the State's needs in a fiscally responsible manner.

Price List

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
T-Box Micro-Processor		
T-Box Standard Configuration	TR-1	$2,352.00
T-Box with Integrated FrameGrabber and Video Input for 6 Cameras	TR-1 Vid	$3,430.00
Video Frame Grabbers		
FrameGrabber	FG PC104	$1,200.50
Power Supplies		
PUP 30 120VAC for T-Box	PUP30	$102.90
120AC/12vdc 800ma P5	120/12ACDC800	$19.60
120AC/12VDC 500 mA Adapter	120/12ACDC500	$18.03
12VDC 2A UnReg	120/12ADCC2A	$36.75
Video Switch		
Video Switch, 8 Camera Input	VID-SW	$563.50
Acoustic Multi-lane Traffic Monitor		
SAS-1	SAS-1	$3,018.40
SAS-1 Wireless Option (plus SAS-1 above)	SAS-1 Wireless	$749.70
Excludes Optional Antenna and Mount per site spec. listed separately below		
Antenna Options		
SAS-1 Internal Drop down Wire anntenna	SAS Int Ant	$24.50
YAGI 13.5 dB Antenna, Cushcraft	YAGI	$153.86
Maxrad Fiber Omni Whip Ant, 8 dB	Whip-8db	$146.80
Maxrad Fiber Omni Whip Ant, 4 dB	Whip-4db	$104.37
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42
Astron Low Profile "Disc" Antenna, 2.4 Ghz	PCNLP-24V	$77.42
Astron Dual Band Antenna for CDMA Modem	NP8619TNXXF	$156.60
Cirronet Corner2414	Corner2414	$220.50
Cirronet Omni249	Omni249	$222.26
Wireless Components	**Part Number**	
SAS- RFM External Base Station (Plus Whip antenna above)	SAS-RFM	$1,171.10
PSX Series in line surge protector	PSX	$93.10
SAS-1 Internal Wireless Option (plus SAS-1)	SAS-1 Wireless	$749.70
SAS- RFM External Remote	SAS-RFM	$1,078.00
PSX Series in line surge protector (Optional, Ant. Dep.)	PSX	$93.10
SAS RFM Remote CT	RFM-CT	$53.90
SAS RFM-CT Base Station Termination	RFM-CT	$53.90
SAS RFM-CT Base Station Termination 170	RFM-CT-170	$57.82
Wireless IP Radio Modem SEM2411X	SEM2411X	$1,763.02
Wireless IP Radio Power Module	SEMPOWER	$63.70
WirelessIP Data Cable (100 ft)	SEMCABLE-100	$235.20
WirelessIP Data Cable (200 ft)	SEMCABLE-200	$470.40
SAS Relay Interface Components		
SAS-RI Type 170 Relay Interface for SAS1	SAS-RI-170	$220.50
SAS-RI Type 170 Relay Interface Daughter Card	SAS-RI-DAU	$53.90
SAS-RI Shelf Mount for NEMA hookup	SAS-RI-SHELF	$220.50

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Item	Item Part Number	NYS Discounted Price
SAS CT Cabinet Termination Options		
SAS CT cabinet termination- 170 Card	SAS-CT-170	$57.82
SAS CT cabinet termination- 170 Card (Rev 2)	SAS-CT-170-2	$97.80
SAS CT cabinet termination- 170 Card (Rev 3) - Avail. Jan 2005	SAS-CT-170-3	$95.40
SAS CT PCB, Mounted	SAS-CT	$100.03
SAS-CT Shelf (Rev 2)	SAS-CT-2	$102.43
SAS-CT Shelf (Rev 3) - Avail. Jan 2005	SAS-CT-3	$100.03
SAS NEMA Base Station Termination	NEMA-CT	$49.00
SAS-1 JB Junction Box		
SAS JB Small w/ 3/4" Saddle	SAS-JB-Small	$44.10
SAS JB LARGE	SAS-JB-Large	$66.15
SAS JB Large (Rev 2)	SAS-JB-Large-2	$90.00
Mounting Equipment for SAS-1		
PELCO 0326-23 Mounting Tube	SE-0326-23	$14.70
PELCO SE-0111 Flat surface mount flange	SE-0111	$11.76
PELCO SE-0454 4" Pole Flange	SE-0454	$11.76
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	$11.76
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	$11.76
Cabinets and Components		
Pole Mount Boxes		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
Internal Components	**Part Number**	
Video surge protectors (TRIPP LITE D10B2)	D10B2	$34.30
Sensor Interfaces		
STS USI2K Universal Serial Interface	USI2K	$646.80
STS BL2000 Process w/Relay Control	BL2000	$665.42
STS Cabinet Watchdog	CWD	$245.00
STS Cabinet Power Relay Module	PRM	$161.70
CT / CWD Cable		$25.20
Modems		
Airling Raven II CDPD	RAVEN II	$568.40
Airlink Redwing CDPD	REDWING	$470.40
Airlink Raven CDMA w/ DC Power Cable	RAVEN-CDMA	$681.11
120v DC to AC Adapter	120-100-1011	$16.20
STS Land Line Modem (POTS)	DCModem	$343.00
StarComm StarPoint Modem (POTS)	Min Qty 20	$294.00
StarComm StarPoint AMPS module	Min Qty 20	$588.00
StarComm StarPoint CDPD module	Min Qty 20	$588.00
StarComm StarPoint CDMA module	Min Qty 20	$799.93
TRIPLITE DTEL2 Telephone Surge Protector	DTEL2	$32.83
RJ-45 CT to DB-9 Modem Cable	CT2Modem	$22.05
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
SAS-CT TO PC serial cable	CT2PC	$22.05
Serial Port Ethernet Adapter and Server		
Programmable IP address and data server		
STS Device Server	STS-DS1	$391.02
1 foot Ethernet Cable, RJ-45 to RJ-45 Cat 5	1Cat5	$4.90
3 foot Ethernet Cable, RJ-45 to RJ-45 Cat 5	3Cat5	$5.88
Power Components		
AC-DC Adapters,Surge Strips, etc.		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
1 AC-DC convert with surge strip	AC-DC Convert	$98.00
SunSaver Battery Regulator	SUN6	$58.80
SunSaver Battery Regulator	SUN10	$90.00
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery, Deep Cycle Marine or Heavy Duty Auto		$120.00
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
Battery Desulfanator	DeSulf	$87.22
Duplex outlet for 120VAC power	DupOut	$14.70

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GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Uninteruptable Power Supply (UPS) Comercial Grade	UPS	$245.00
Optional Solar Power Supply with Battery Backup		
80 Watt Solar Panel (expected to be typical)	BP380	$391.02
Solar Panel Mount	HPMV-80	$77.42
30 Wire Kit, Solar Panel Home Run	OPWK10-30	$17.64
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$83.30
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
RG-59 Cable Connectors	RG-59Crimp	$24.50
RG-59 Cable for Video Hook-up, $/ft.	RG-59U	$0.44
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft.	Beldon9504	$0.49
Cameras and Accessories		
Extreme CCTV EX-10 Color Camera	EX-10C	$792.00
Camera Junction Box	CAM-JB	$53.90
RG-59 cable assemblies	RG-59 Cable	$24.50
BNC to RCA Video Cable		$17.77
EX14 (Larger version of EX-10 with D/N Configuration)	EX14MX.4-VA408	$1,366.00
Extreme CCTV EX-82 Camera		
Model EX82D8-V4 (4 to 8 mm lens -- wider angle)	EX82D8-V4	$2,578.00
Model EX82D-V6 (6 to 15 mm lens -- closer image, fixed lens)	EX82D8-V6	$2,578.00
DiTek Video Surge Protector	DTK-4TPV	$98.66
Dual camera configuration with 200ft of night vision	ZX55D8V550	$4,500.00
EX27 - All-weather Rugged MX4 Day/Night Camera	EX27MNX.4-VA408	$1,424.00
Weather Sensors		
Road Sensor with RS-485 Interface		
IRS-1 with 25m lead cable and two sub-surface sensors at 40 and 150cm	8410.02	$6,738.00
IRS-21 with 25m lead cable	8410.00	$5,568.00
50m lead cable option		$210.00
100m lead cable option		$420.00
IRS-21 with RS-232 interface	IRS21.232	$682.20
RS-485 / 232 Converter		$560.00
Present Weather Sensor		
R2S with RS-485 Interface (includes 24v power supply and shield)	8367.01	$4,800.00
25m lead cable option		$105.00
50m lead cable option		$210.00
100m lead cable option		$420.00
RM Young Wind Monitor with Digital Interface		
Models 05103 and 32400, w/cable		$2,124.00
1-Wire Systems Digital Environmental Sensors		
STP-1 Temperature Probe with Stainless Steel Tube		$162.00
1-Wire Relative Humidity Sensor		$480.00
1-Wire Wind Monitor		$420.00
30-Foot Weather Tower		
Glen Martin Folding Tower with base, anti-climb barrier, & shipping to site	MF-1330	$4,740.00
Labor		
Trichord, Inc. or SmarTek Systems (hourly rate)	LABOR	$115.00
Labor for Provisioning CDMA Modems (per modem)	CDMA-Labor	$75.00
Technical Support		
Depot Maintenance Support for CDMA Modems	CDMA-Support	$75.00
Wireless Communication Plans		
Verizon Wireless CDMA Communication Plan (per month / unlimited data transfer)	VW-Comm	$80.00

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Item	Item Part Number	NYS Discounted Price
BUNDLED CONFIGURATIONS		
CONFIGURATION #1-170: **SAS-1 (hardwired) with Relay Interface** **Type 170 Card File** > SAS Standalone sensor into a control cabinet > AC Power to SAS-1 with Battery Backup, NY Cabinet > Base: NY State Supplied Cabinet, Controller, Power Supply & Card File (Type 170)	See Catalog Pages 130-31	
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB Small w/ 3/4" Saddle	SAS-JB-Small	
SAS CT cabinet termination- 170 Card	SAS-CT-170	
SAS-RI Type 170 Relay Interface for SAS1	SAS-RI-170	
SAS-RI Type 170 Relay Interface Daughter Card	SAS-RI-DAU	
	Final Bundle Price:	**$3,400.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
CONFIGURATION #1-NEMA: **SAS-1 (hardwired) with Relay Interface** **NO Card File into NY State Controller** **Shelf Mount Relay Interface** > SAS Standalone Sensor into a control cabinet > Base: NY State Supplied Cabinet, Controller, and Power Supply	See Catalog Pages 130-31	
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB Small w/ 3/4" Saddle	SAS-JB-Small	
SAS CT PCB, Mounted	SAS-CT	
SAS-RI Shelf Mount for NEMA hookup	SAS-RI-SHELF	
	Final Bundle Price:	**$3,350.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49

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Item	Item Part Number	NYS Discounted Price
CONFIGURATION #1-170 (wireless):	See Catalog Pages 130-31	
SAS-1 (wireless), Internal to SAS-1		
Type 170 Card File		
SAS-1 Relay Interface		
> SAS Standalone Sensor Wireless Point-to-point Report to Base Station		
> AC Power to SAS-1 with Battery Backup, NY Cabinet		
> Base: NY State Supplied Cabinet, Controller, Power Supply, and Card File		
SAS-1	SAS-1	
SAS-1 Wireless Option (plus SAS-1 above)	SAS-1 Wireless	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB Small w/ 3/4" Saddle	SAS-JB-Small	
SAS CT PCB, Mounted	SAS-CT	
SAS- RFM External Base Station	SAS-RFM	
PSX Series in line surge protector (optional, ant. dep.)	PSX	
SAS RFM-CT Base Station Termination 170	RFM-CT-170	
Maxrad Fiber Omni Whip Ant, 4 dB	Whip-4db	
SAS-RI Type 170 Relay Interface for SAS1	SAS-RI-170	
SAS-RI Type 170 Relay Interface Daughter Card	SAS-RI-DAU	
	Final Bundle Price:	**$5,550.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
CONFIGURATION #1-NEMA (wireless):	See Catalog Pages 130-31	
Multiple SAS-1 (wireless) with Relay Interface		
NO Card File into NY State Controller		
Shelf Mount Relay Interface		
> 2 or more SAS-1, Sharing Common SAS-RFM and Remote Power		
> Base: NY State Supplied Cabinet, Controller, and Power Supply		
SAS-1	SAS-1	
SAS-1 Wireless Option (plus SAS-1 above)	SAS-1 Wireless	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB Small w/ 3/4" Saddle	SAS-JB-Small	
SAS CT PCB, Mounted	SAS-CT	
SAS- RFM External Remote	SAS-RFM	
SAS RFM Remote CT	RFM-CT	
SAS RFM-CT Base Station Termination	RFM-CT	
SAS- RFM External Base Station	SAS-RFM	
PSX Series in line surge protector	PSX	
Maxrad Fiber Omni Whip Ant, 4 dB	Whip-4db	
SAS-RI Shelf Mount for NEMA hookup	SAS-RI-SHELF	
	Final Bundle Price:	**$6,650.00**

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Item	Item Part Number	NYS Discounted Price
CONFIGURATION #1A-170: **SAS-1 (hardwired) with Relay Interface** **Type 170 Card File** > Base: NY State Supplied Cabinet, Controller, Power Supply & Card File	See Catalog Page 132	
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT cabinet termination- 170 Card	SAS-CT-170	
SAS-RI Type 170 Relay Interface for SAS1	SAS-RI-170	
SAS-RI Type 170 Relay Interface Daughter Card	SAS-RI-DAU	
	Final Bundle Price:	**$3,400.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
CONFIGURATION #1A-NEMA: **SAS-1 (hardwired) with Relay Interface** **Shelf Mount Relay Interface** **NEMA or Shelf Mount Controller** > Base: NY State Supplied Cabinet, Controller, Power Supply & Card File	See Catalog Page 132	
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
SAS-RI Shelf Mount for NEMA hookup	SAS-RI-SHELF	
	Final Bundle Price:	**$3,350.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
CONFIGURATION #1-170 (Fiber): **SAS-1 (hardwired) with No Relay Interface** **Type 170 Card File** **Communication via Fiber Modem** > Base: NY State Supplied Cabinet, Fiber Modems, Controller, Power Supply & Card File	See Catalog Page 133	
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
RJ-45 CT to DB-9 Modem Cable (price below includes 2)	CT2Modem	
SAS-RI Type 170 Relay Interface for SAS1	SAS-RI-170	
SAS-RI Type 170 Relay Interface Daughter Card	SAS-RI-DAU	
	Final Bundle Price:	**$3,450.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49

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Item	Item Part Number	NYS Discounted Price
CONFIGURATION #1-Fiber:		
SAS-1 (hardwired) with Relay Interface		
NO Type 170 Controller		
Communication via Fiber Modem		
> Base: NY State Supplied Cabinet, Fiber Modems, Power Supply		
SAS-1 (quantity as required)	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425) (Qty. as Req'd)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe) (Qty. as Req'd)	SAS Tube 17	
SAS JB LARGE (quantity as required)	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
RJ-45 CT to DB-9 Modem Cable (1 req'd per site)	CT2Modem	
	Final Bundle Price:	**$3,150.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
(note: Options below are NOT included in the Bundle Price)		
Optional Site Pole Mount Cabinet		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
Optional Solar Power Supply with Battery Backup		
80 Watt Solar Panel (expected to be typical)	BP380	$391.02
Solar Panel Mount	HPMV-80	$77.42
30 Wire Kit, Solar Panel Home Run	OPWK10-30	$17.64
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$83.30
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66

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Item	Item Part Number	NYS Discounted Price
CONFIGURATION #2:	See Catalog Page 134	
SAS-1 (hardwired) Data Collection Site		
Communications Options		
> Base: NY State Supplied Cabinet and Power Supply		
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
Interface Cable (depends on site connection):		
SAS-CT TO PC serial cable **or**	CT2PC	
RJ-45 CT to DB-9 Modem Cable (1 req'd per site)	CT2Modem	
	Final Bundle Price:	**$3,175.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
(note: Options below are NOT included in the Bundle Price)		
Optional Site Pole Mount Cabinet		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42
Optional Solar Power Supply with Battery Backup		
80 Watt Solar Panel (expected to be typical)	BP380	$391.02
Solar Panel Mount	HPMV-80	$77.42
30 Wire Kit, Solar Panel Home Run	OPWK10-30	$17.64
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$83.30
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66

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Item	Item Part Number	NYS Discounted Price
CONFIGURATION #3:	See Catalog Page 135	
SAS-1 (hardwired) Traffic Information and JPEG Image Site		
SAS-1 and Camera Inputs to T-Box		
> Base: NY State Supplied Cabinet, Power Supply, and Communication Option		
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
Extreme CCTV EX-10 Color Camera	EX-10C	
Camera Junction Box	CAM-JB	
RG-59 cable assemblies	RG-59 Cable	
Video surge protectors (TRIPP LITE D10B2)	D10B2	
T-Box Standard Configuration	TR-1	
FrameGrabber	FG PC104	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$7,750.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
(note: Options below are NOT included in the Bundle Price)		
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$87.22
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

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CONFIGURATION #4:	See Catalog Page 136	
SAS-1 (hardwired) Traffic Information and JPEG Image Site		
SAS-1 & Multiple Camera Inputs to T-Box		
Other Sensors Optional		
> Base: NY State Supplied Cabinet, Power Supply, and Modem		
SAS-1	SAS-1	
SAS Flange 4" Pole Thread Flange (PBH-425)	PBH-425	
SAS Tube 17 (P17 Threaded 80 Gauge Aluminum Pipe)	SAS Tube 17	
SAS JB LARGE	SAS-JB-Large	
SAS CT PCB, Mounted	SAS-CT	
Extreme CCTV EX-10 Color Camera	EX-10C	
Camera Junction Box	CAM-JB	
RG-59 cable assemblies	RG-59 Cable	
Video surge protectors (TRIPP LITE D10B2)	D10B2	
Video Switch, 8 Camera Input	VID-SW	
T-Box Standard Configuration	TR-1	
FrameGrabber	FG PC104	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$8,300.00**
Beldon 9504 4PR, 1GND Foil Shield Cable, $/ft. Usually sold in 500 & 1000 ft. rolls and cut on job site	Beldon9504	$0.49
(note: Options below are NOT included in the Bundle Price)		
Optional Interfaces to Other Sensors (Temperature, Weather, Chemical, etc.)		
STS USI2K Universal Serial Interface	USI2K	$646.80
(Must be programmed for specific device, separate estimate if not already completed)		
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #4A:	See Catalog Page 137	
Traffic Information and JPEG Image Site		
Data Collection Hub with Multiple Camera Inputs to T-box		
Other Sensors Optional		
> Base: NY State Supplied Cabinet, Power Supply, and Modem		
SAS- RFM External Base Station	SAS-RFM	
PSX Series in line surge protector	PSX	
SAS RFM-CT Base Station Termination	RFM-CT	
Maxrad Fiber Omni Whip Ant, 4 dB	Whip-4db	
Extreme CCTV EX-10 Color Camera	EX-10C	
Camera Junction Box	CAM-JB	
RG-59 cable assemblies	RG-59 Cable	
Video surge protectors (TRIPP LITE D10B2)	D10B2	
Video Switch, 8 Camera Input	VID-SW	
T-Box Standard Configuration	TR-1	
FrameGrabber	FG PC104	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$6,550.00**
(note: Options below are NOT included in the Bundle Price)		
Optional Interfaces to Other Sensors (Temperature, Weather, Chemical, etc.)		
STS USI2K Universal Serial Interface	USI2K	$646.80
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #4B:	See Catalog Page 138	
Camera & Traffic Data Site Without SAS-1 Input		
Data Collection Site with Multiple Camera Inputs to T-box		
Other Sensors Optional		
> Base: NY State Supplied Cabinet, Power Supply, Modem, Existing Traffic Loops & ADR-3000		
STS USI2K Universal Serial Interface	USI2K	
Extreme CCTV EX-10 Color Camera	EX-10C	
Camera Junction Box (Qty. as Req'd)	CAM-JB	
RG-59 cable assemblies (Qty. as Req'd)	RG-59 Cable	
Video surge protectors (TRIPP LITE D10B2)	D10B2	
Video Switch, 8 Camera Input	VID-SW	
T-Box Standard Configuration	TR-1	
FrameGrabber	FG PC104	
STS Cabinet Watchdog (opt)	CWD	
STS Cabinet Power Relay Module (opt)	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$5,800.00**
(note: Options below are NOT included in the Bundle Price)		
Optional Interfaces to Other Sensors (Temperature, Weather, Chemical, etc.)		
STS USI2K Universal Serial Interface	USI2K	$646.80
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #4C:	See Catalog Page 139	
Data Collection Site with Multiple Camera Inputs to T-box with Integrated Video Switch and Framegrabber		
Other Sensors Optional		
> Base: NY State Supplied Cabinet, Power Supply, Modem, Existing Traffic Loops & ADR-3000 or use of SAS-1 sensors for traffic data		
STS USI2K Universal Serial Interface	USI2K	
Extreme CCTV EX-10 Color Camera	EX-10C	
Camera Junction Box	CAM-JB	
RG-59 cable assemblies	RG-59 Cable	
Video surge protectors (TRIPP LITE D10B2)	D10B2	
T-Box with Integrated FrameGrabber and Video Input for 6 Cameras available 2003	TR-1 Vid	
STS Cabinet Watchdog (opt)	CWD	
STS Cabinet Power Relay Module (opt)	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$5,100.00**
(note: Options below are NOT included in the Bundle Price)		
Optional Interfaces to Other Sensors (Temperature, Weather, Chemical, etc.)		
STS USI2K Universal Serial Interface	USI2K	$646.80
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #5:	See Catalog Page 140	
Site with Existing Loops, Camera & Traffic Data Site w/o SAS-1 Input		
Data Collection Site, No Video, Option ADR-3000 Shown as Loop Interface		
Other Sensors Optional		
> Base: NY State Supplied Cabinet, Power Supply, Modem, Existing Traffic Loops & ADR-3000		
STS USI2K Universal Serial Interface	USI2K	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$1,075.00**
(note: Options below are NOT included in the Bundle Price)		
Optional Site Pole Mount Cabinet		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
Optional Interfaces to Other Sensors (Temperature, Weather, Chemical, etc.)		
STS USI2K Universal Serial Interface	USI2K	$646.80
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42
Optional Solar Power Supply with Battery Backup		
80 Watt Solar Panel (expected to be typical)	BP380	$391.02
Solar Panel Mount	HPMV-80	$77.42
30 Wire Kit, Solar Panel Home Run	OPWK10-30	$17.64
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$83.30
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #6:	See Catalog Page 141	
Camera & Traffic Data Site w/o SAS-1 Input		
Data Collection Site, No Video, Option 2 Loop Detectors		
> Base: NY State Supplied Cabinet, Power Supply, Modem, Existing Traffic Loops & Loop Detectors		
STS BL2000 Process w/Relay Control	BL2000	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$1,075.00**
(note: Options below are NOT included in the Bundle Price)		
Optional Site Pole Mount Cabinet		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

SmarTek Systems Equipment Price List
Trichord, Inc. - New York State Contract No. PC60689

Note: Changes under current (03/05) update listed in red

SmarTek Manufactured Items Distributed by Trichord

Item	Item Part Number	NYS Discounted Price
CONFIGURATION #7:	See Catalog Page 142	
Camera & Traffic Data Site w/o SAS-1 Input		
Data Collection Site, No Video, Option 2 IDC TSR Counter Interface		
> Base: NY State Supplied Cabinet, Power Supply, Modem, Existing Traffic Loops & IDC TSR		
STS USI2K Universal Serial Interface	USI2K	
STS Cabinet Watchdog	CWD	
STS Cabinet Power Relay Module	PRM	
SAS-CT TO PC serial cable	CT2PC	
	Final Bundle Price:	**$1,075.00**
Optional Site Pole Mount Cabinet		
NAZTECH Type II Control Cabinet with Pole Mount brackets	NAZTECH Cab	$441.00
(note: Options below are NOT included in the Bundle Price)		
Optional AC to DC Power Supply Option with Battery Backup		
AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)	2 AC-DC Convert	$122.50
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
GFI outlet, 2 Pos. 120VAC	GFIOut	$24.50
Optional Solar Power Supply with Battery Backup		
80 Watt Solar Panel (expected to be typical)	BP380	$391.02
Solar Panel Mount	HPMV-80	$77.42
30 Wire Kit, Solar Panel Home Run	OPWK10-30	$17.64
SunSaver Battery Regulator	SUN6	$58.80
Battery, Deep Cycle	PVX-1080T or 8A27	$156.80
Battery Desulfanator	DeSulf	$83.30
Battery Stand, 1/4" Aluminum	BAT Stand	$16.66
Communications Options		
Airlink Redwing CDPD	REDWING	$470.40
DB-9 to DB-9 (TBox to Modem) Cable	NULL	$19.11
Astron Low Profile "Disc" Antenna, CDPD	PCNLP-08V	$77.42

Product Data Sheets

T-Box Micro-Processor

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model TR-1

T-BOX Remote Processing Unit

Specifications

The SmarTek Systems, Inc. T-BOX Remote Processing Unit (RPU) is a fully programmable and capable cabinet processor for use in harsh environments like roadside cabinets. The T-BOX RPU requires modest power and has a very small foot print. The T-BOX RPU uses a standard PC-104/PC-104 Plus expansion bus to provide almost unlimited peripheral interface capability and flexibility including optional Multi-Channel Color Video Image Capture and Compression. The T-BOX is completely programmable with impressive amounts of RAM, Non-Volatile Flash Memory, and Processor Speed to make it quite flexible for:

- Distributed Processing and Control Architectures,
- Event Driven Measurement and Information Processing,
- Specialized Interface and Data Collection/Archiving Requirements,
- Standard or Specialized Communication Protocols,
- Easy Integration with Multiple Sensor Types

Physical

Size……..5.5 in W x 9.25 in D x 2.5 in H
Operating Temperature…-35 Deg C to 75 Deg C
Enclosure…….Enamel Coated Steel and Aluminum for Shelf Mount

Memory and Processor

RAM……...2 M to 32 M Bytes
Non-Volatile Flash ……..0.5 M Bytes to 144 M Bytes
From I-386 to Pentium Level Processing

Signal Interfaces

2 Full RS-232, Port A, Port B……Rx, Tx, Gnd, DCD, DTR, DSR, RTS, and CTS
Fully Programmable RS-232 Baud Rate from 2400 to 115.2 KBPS
Bi-Directional Parallel (TTL)

Display and Switches

4 Digit Front Panel LEDs or 4 Digit Front Panel LEDs or 2-line, multi-character LCD Display (Avail. Early 2003)
3 Front Panel Switches (1-Reset, and 2 Software Programmable)

Power

Input Voltage ....…….5 VDC
Required Power .....Less than 7 Watt
Internal Software Enabled Watchdog Timer/Reset

Clock

Battery-Backed Real Time Clock

Expansion

Bus…….PC-104/PC-104 Plus
Optional Multi-Channel Color Video Image Capture (1 to 6 Channels On-Board) or use an External video switch for 8 to 24 Channels
Optional Floppy and IDE Disk Interface
Optional Ethernet Interface

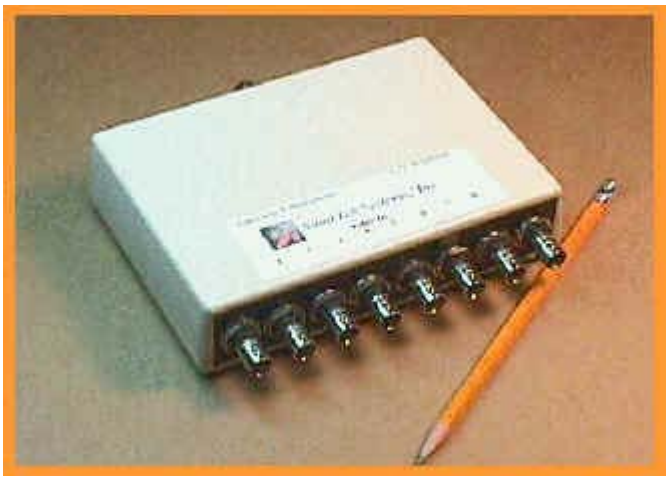
410-315-9727 sales@smarteksys.com www.smarteksys.com

Video Switch

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model VID-SW

The VID-SW Video Switch/Multiplexer



VID-SW Video Switch

The VID-SW Video Switch/Multiplexer Wideband video switching with 8 inputs and a single output.

A low power, low cost video switch designed for the environmental extremes of the remote site and roadside cabinet.

- Small Foot Print
- Wide Temperature Range
- DC Powered
- Ideal to bring 8 video inputs (BNC Connectors) to a single output under T-BOX Control

A general purpose video switch with a programmable input is suitable for use with a micro-controller such as TBox for video signal sampling and multiplexing from up to 8 video inputs. The onboard video amplifier features a 160Mhz unity gain bandwidth, minimum of 250 V/msec slew rate and directly drives a 150 ohm load to +3v. The device has a 100MHz bandwidth (Av=6dB), with a 15nsec channel switch time and directly drives 50 ohm cables.

This device was specifically designed for use at remote sites with low power and wide temperature range requirements. Typical applications include highway traffic monitoring, and security and surveillance applications, particularly sites utilizing solar or battery power for operation. The switch may also be used as a low cost alternative to more expensive switches in simple store or loading dock monitoring where images are needed at a remote location. Coupled with a video capture card in TBox, captured images can be sent to just about any location via conventional telephone line, cellular link or LAN/WAN.

Key Features

Supply Voltage.....Regulated 5VDC
Power Requirements.....1.5 Watts
I/O Interfaces:
8-bit mini-DIN TTL I/O control
8 BNC to 1 BNC Video
Dimensions.....6.08"x1.5"W x 4.26"H
Finish.....Gray Enamel
Weight.....Less than 2 lb.
Temperature....0 C to 70 C (-40 C to 85 C Available)

410-315-9727 sales@smarteksys.com www.smarteksys.com

SAS-1 Acoustic Multi-Lane Traffic Monitor

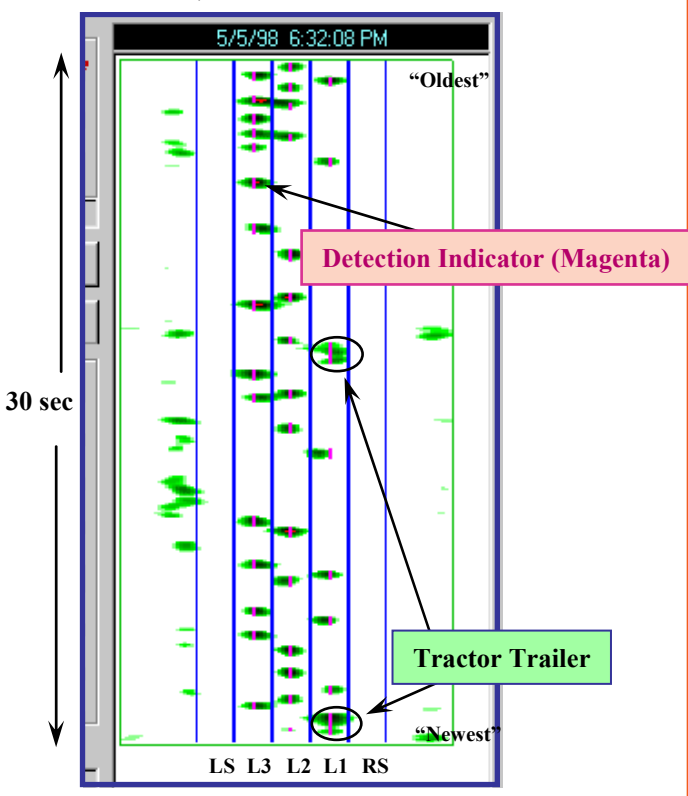
SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model SAS-1

SAS-1 Acoustic Sensor

Small, Low power, Side Mount, Multi-lane Sensor

A SAS-1 Acoustic Highway "Image" as shown on SAS Monitor companion software, included with the sensor.



Each "Blob" Shows Position and Strength of Each Vehicle's Acoustic Intensity:
- Light Green is Weakest
- Dark Green/Red is Strongest

The SAS-1 operates in the adverse environments found on roadside structures. SAS-1 is an easy to use, programmable sensor ready to detect multiple lanes of traffic for real-time operations, or to collect traffic counts with 3 levels of classification.

- **Low Power, Multi-Lane Sensor**
- **Wireless Option Eliminates Home Run Cables**
- **Easy Installation Eliminates Lane Closures**
- **Ideal Back-fit for Failed Loops**
- **Built in Upgrade Path for Vehicle Type Identification**
- **Wrong Way Detection for Off-Ramp Warning**
- **Addressable to Support Networking**

Advanced signal and spatial processing provides the capability for high resolution multi-lane traffic flow monitoring with no loss of "lane switchers" at the detection zone.

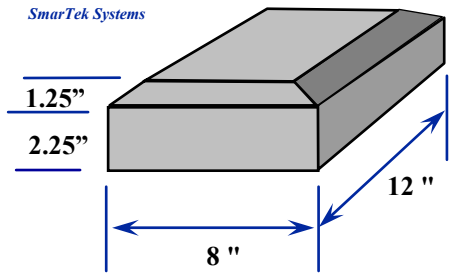
The SAS-1 is quickly and easily installed, with no lane closures needed for the "side-fire" configuration. Low power consumption supports operating entirely from solar power.

410-315-9727 sales@smarteksys.com www.smarteksys.com

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model SAS-1
Acoustic Sensor

SAS-1 Dimensions



Specifications

Number of Lanes and Message Formats

The SAS-1 can monitor 5 lanes and provides for several different interfaces depending on the communication link and the cabinet controller interface desired. The standard SAS-1 output message provides per lane traffic flow measurements of vehicle volume, lane occupancy, and average speed for a selectable update period (1 to 220 seconds). A bit serial vehicle presence relay message or opto-isolated dry contact vehicle presence relay signals (using the SAS Relay Interface) can be provided.

Measurement Archiving

Up to 60 days depending on size of installed Flash Memory (1, 2, or 4 Mbits).

Signal Interfaces

1) RS-422 (Standard) ..... Hard Wired Home Run (up to 2000 feet)
2) RS-232 (Optional) ..... Hard Wired Home Run (up to 100 feet)
3) Wireless (Optional) ..... Wireless Link (2.4 GHz Spread Spectrum)

Power

1) Supply Voltage at the Sensor ..... 8 to 24 VDC
2) Required Power ..... Less than 2 Watts

Physical

1) Dimensions .....12 in long x 8 in wide x 3.5 in deep
2) Weight (with Bracket) ..Less than 7 lb.
3) Material/Finish .....Aluminum/Enamel/Stainless Steel Fasteners
4) Mounting Bracket .....2 inch Diameter Aluminum Tube/Stainless Steel Bands
5) Operating Temp.....-20 Deg C to 75 Deg C
6) Humidity.....5% to 100%
7) Shock.....NEMA TS2-2.1.10
8)Vibration.....NEMA TS2-2.1.9

Installation

Mount on roadside structure for coarse mechanical positioning so that the sensor face is pointing toward the center of the lanes to be monitored. After the SAS-1 is mechanically oriented and locked down, the position and size of each detection zone (up to 5) are electronically set using the SAS Monitor and Setup program. All SAS-1 setup parameters are stored in non-volatile memory.

1) Height Above Pavement ..... 25 to 40 feet
2) Horizontal Distance to First Detection Zone ..... 5 to 30 feet
3) Coarse SAS-1 Orientation .....Mechanical
4) Precise Detection Zone Position and Size .....Electronic

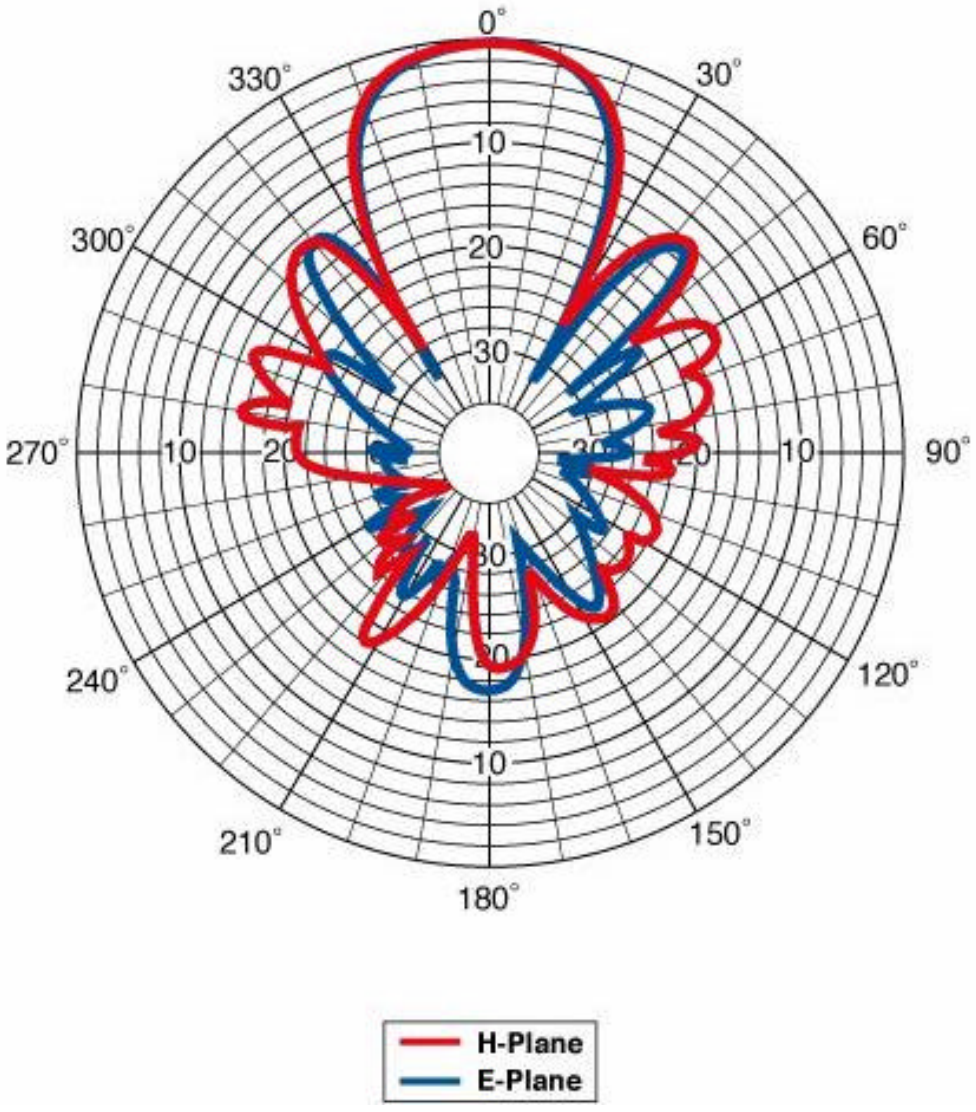
Antennas

Directional Yagi Antenna - Part Number: YAGI2415
Specifications (Electrical and Mechanical)

SPECIFICATIONS	**YAGI2415**
Frequency	2.4 – 2.5 GHz
Gain	15 dBi
Bandwidth @ 1.5:1 SWR (-3dB Beamwidth)	30 MHz (E-Plane) 34 MHz (H-Plane)
Nominal Impedance	50 Ohms
Maximum Power	50 Watts
Vertical Beam Width	44 Degrees
Horizontal Beam Width	35 Degrees
Front-To-Back Ratio	18 dB
Wind Surface Area	0.4 ft^2 (.04 M^2)
Number of Elements	15
Wind Survival	125 Mph (200 Kph)
Wind Survival (1/2" Ice)	100 Mph (161 Kph)
Material (Radome)	UV Stable Polycarbonate
Material (Radiating Element)	Copper
Material (Boom)	6061 T6 Aluminum
Material (Hardware)	Stainless Steel
Material (Elements – NOT Radiator)	6061 T6 Aluminum Rod
Weight	<1 Lb. (.473 Kg)
Mounting	Pole/Mast & Surface
Interface Connector	"N" Female
Mounting Hardware Kit	Included (U-bolts)
Length	26 In. (66 Cm)
Mounting Dimensions (Max.)	Cylindrical Mast 2 1/8" (5.4 Cm)

Digital Wireless Corporation ¨ One Meca Way ¨ Norcross, Georgia ¨ USA
Phone: 770.564.5540 ¨ Fax: 770.564.5541 ¨ E-mail: mkting@digiwrls.com

YAGI2415



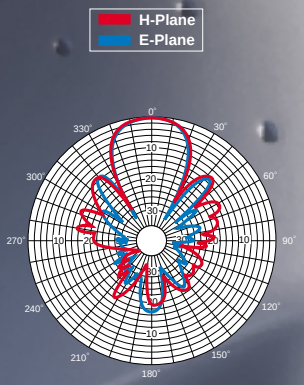
Digital Wireless Corporation ¨ One Meca Way ¨ Norcross, Georgia ¨ USA
Phone: 770.564.5540 ¨ Fax: 770.564.5541 ¨ E-mail: mkting@digiwrls.com

PRODUCT DATA SHEET

CUSHCRAFT CORPORATION

2.4 GHz DATA TRANSMISSION YAGI

- UV stable housing
- One piece copper radiating element
- Advanced microwave substrate
- Stainless steel hardware
- UltraLink® Pigtail



PC2415N

PC2415N

2.4 GHz Yagi

For those long-range directional applications, Cushcraft has designed the PC2415N Yagi. It produces a gain of 13.9 dBd and can be mounted in a number of ways. The model shown utilizes the flat plate design although many others could be used. Cushcraft has the ability to modify this model for OEM applications to fit your needs. The UV-stabilized polycarbonate radome shields the antenna from the sun and all weather conditions.

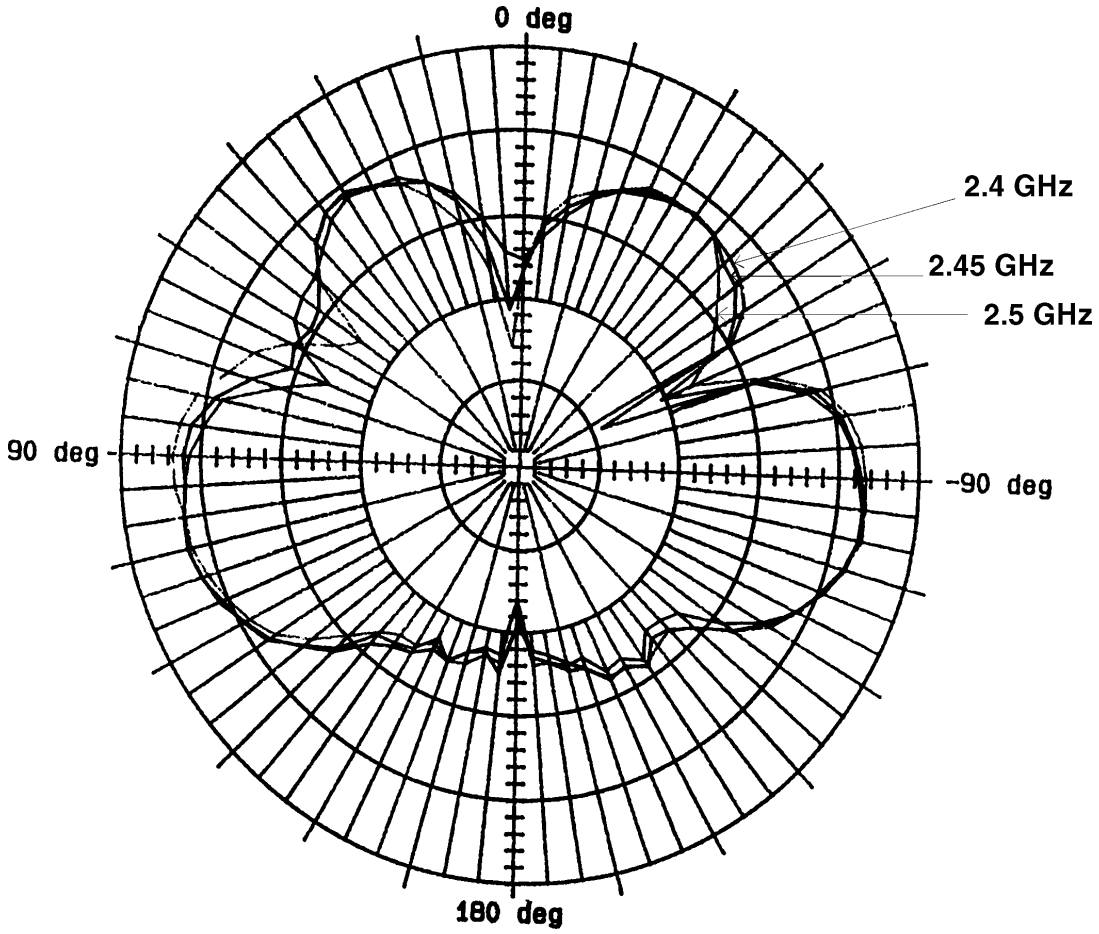
DATA TRANSMISSION YAGI SPECIFICATION CHART

Model:	PC2415N	PC18513N	PC17113N
Frequency: MHz	2400-2500	1850-1990	1710-1880
Gain:	13.9 dBd	13	13
Number Elements:	15	13	12
Front-to-Back Ratio:	18 dB	14	13
E-Plane (3 dB beamwidth):	30º	35º	35º
H-Plane (3 dB beamwidth):	34º	35º	35º
Radiating Element:	Brass	Brass	Brass
Impededance (Ohms):	50	50	50
RF Connector:	Type N female	Type N female	Type N female
Weight:	<1 lbs. (.473)	1.25 (.56)	1.25 (.56)
Mounting:	Mast mounted w/U-Bolts & Brackets		
Enclosure:	UV Stable Polycarbonate		
Mast Diameter Max.:	2-1/8" (5.4cm)	2-1/8" (5.4cm)	2-1/8" (5.4cm)
Ultralink Cable: in (cm)	12" (30.5 cm)	12" (30.5 cm)	12" (30.5 cm)

48 Perimeter Road, Manchester, NH 03103 • Phone: 603-627-7877 • Fax: 603-627-1764 • E-mail: sales@cushcraft.com
Web Site: www.cushcraft.com

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

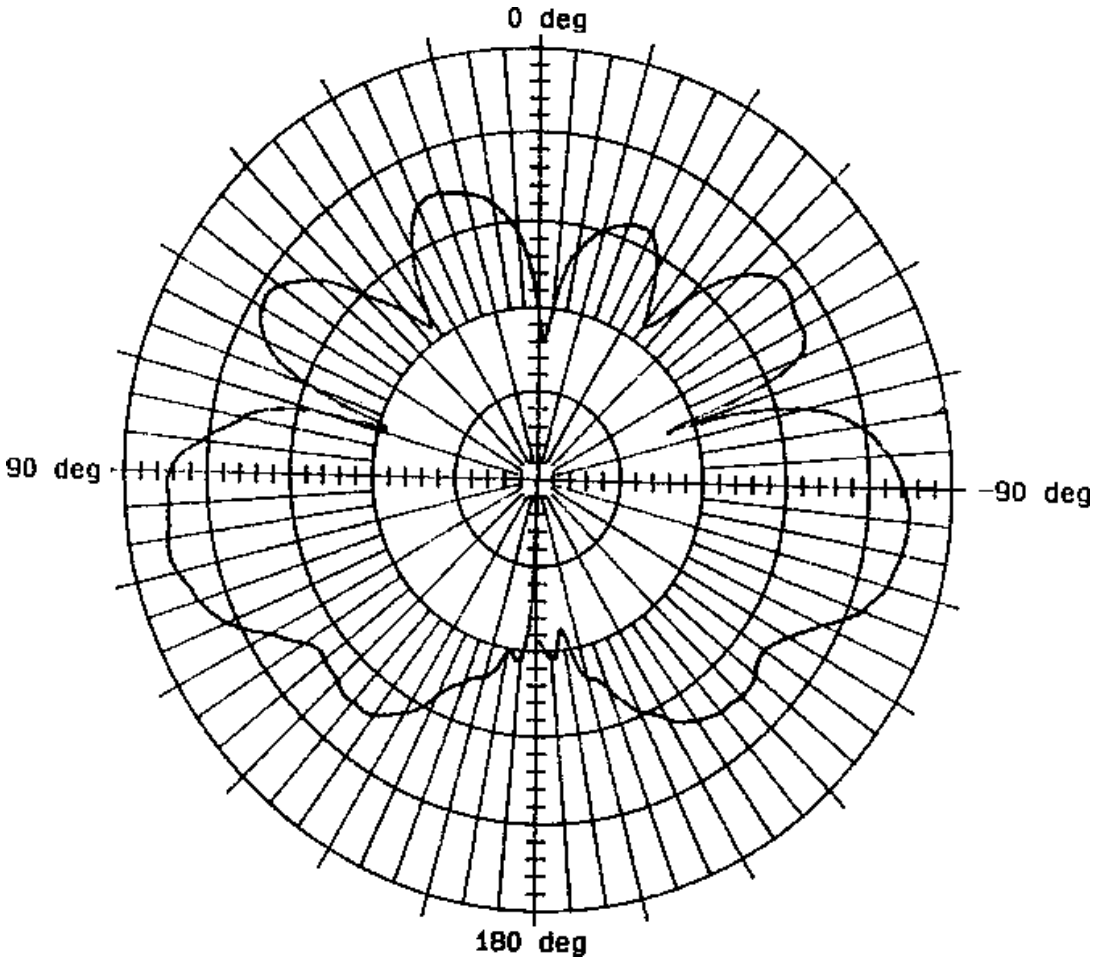
Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077



MFB24004 Elevation Cut at 2.4 GHz, 2.45 GHz and 2.5 GHz Frequencies

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

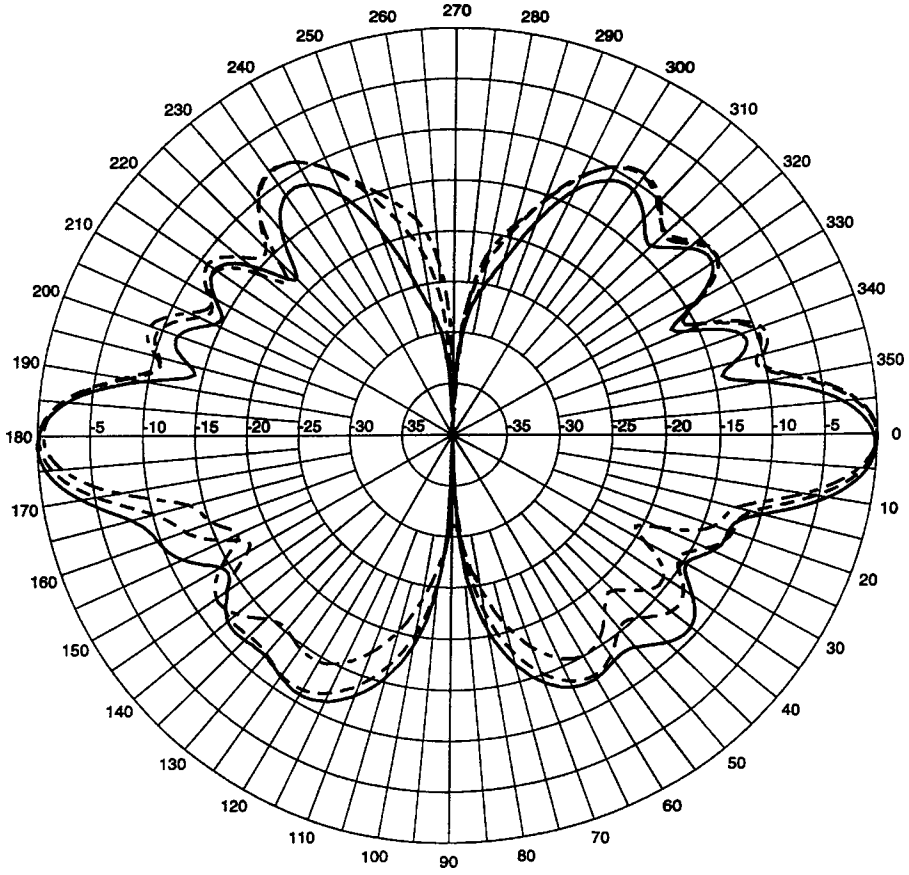
Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077



MFB24006 Elevation Cut

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

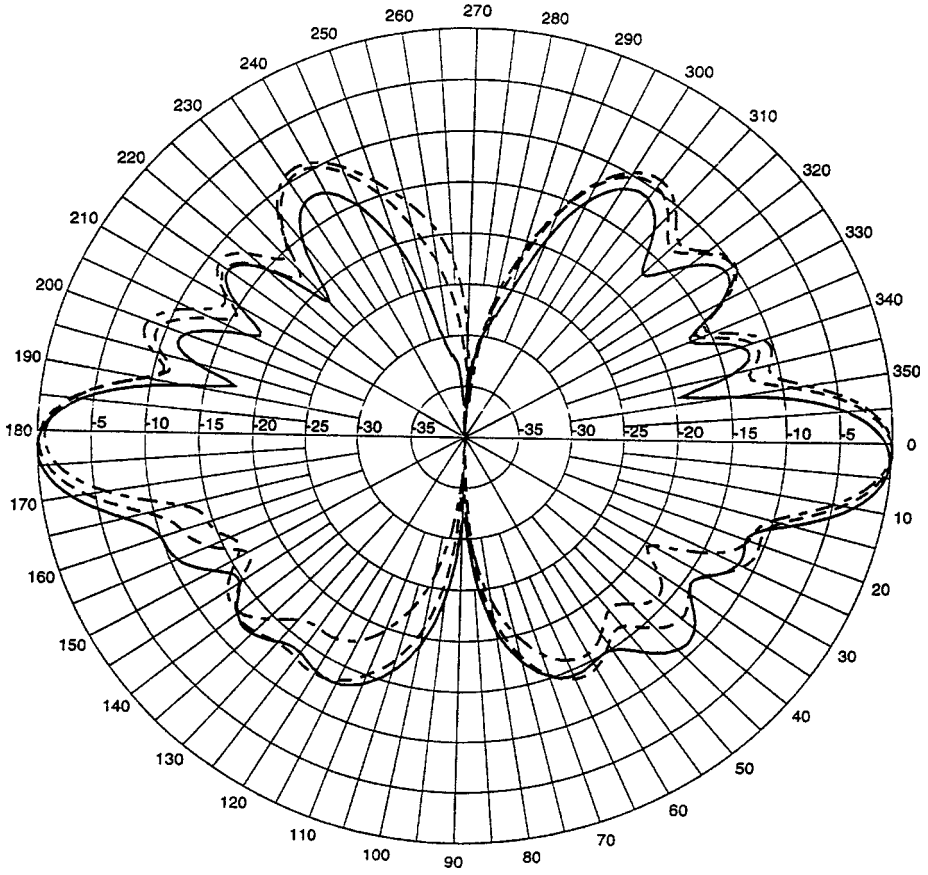
Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077



MFB24008 Elevation Cut

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077

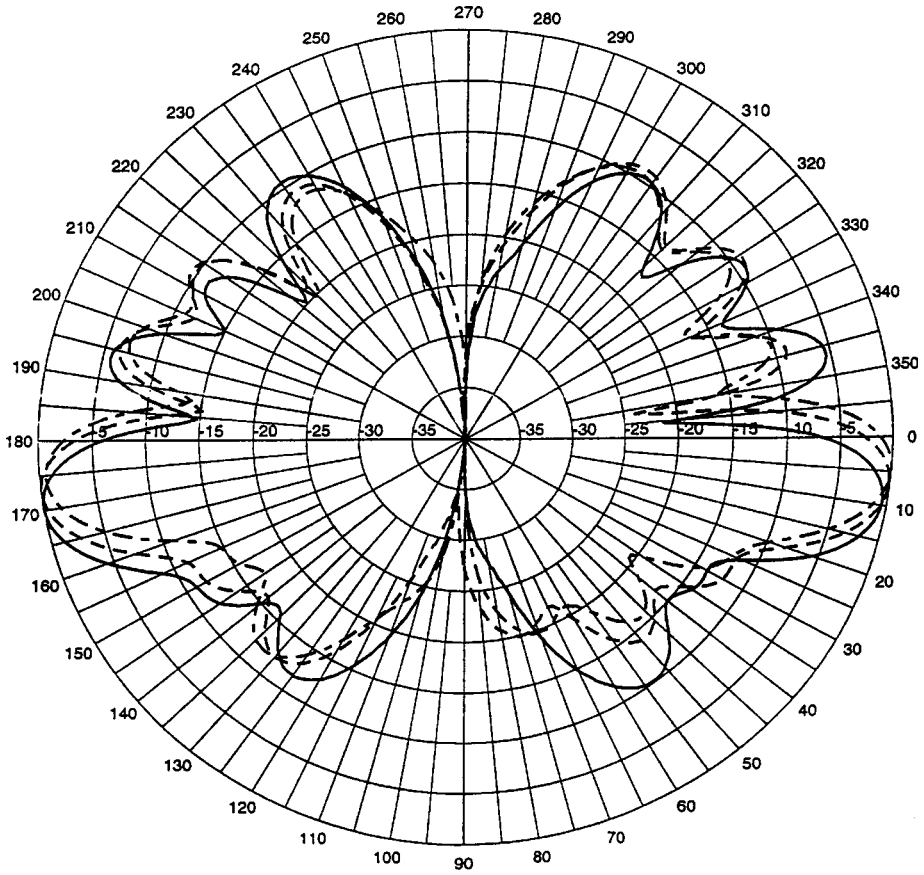


MFB24008-DT2 Elevation Cut

MAXRAD
STATE OF THE ART ANTENNAS

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

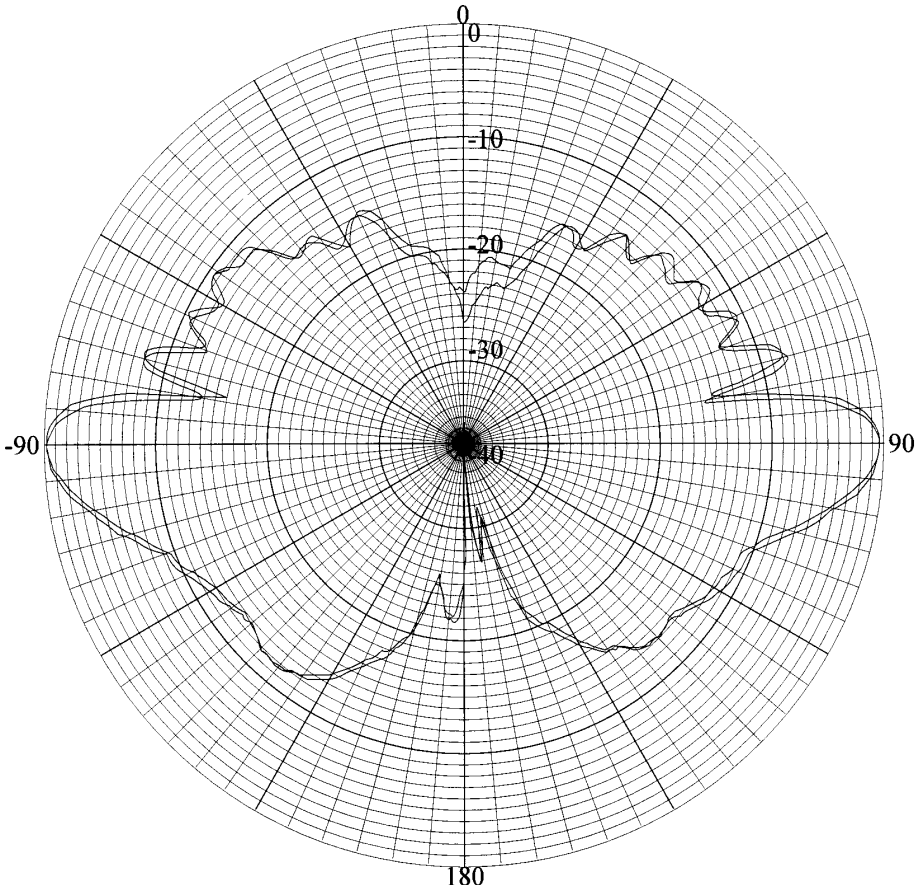
Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077



MFB24008-DT7 Elevation Cut

MAXRAD, Inc.
4350 Chandler Drive
Hanover Park, IL 60103-6763

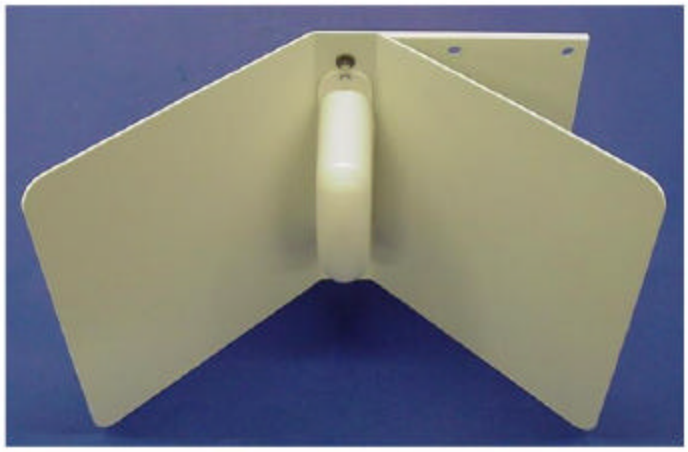
Orders: (800) 323-9122
Phone: (630) 372-6800
Fax: (630) 372-8077



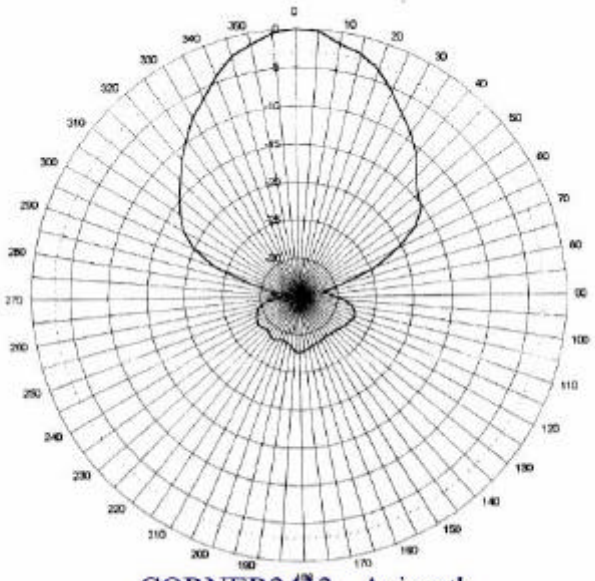
MFB24010 Elevation Cut

Corner Reflector Antenna Part Number: CORNER-2414
Specifications (Electrical and Mechanical)

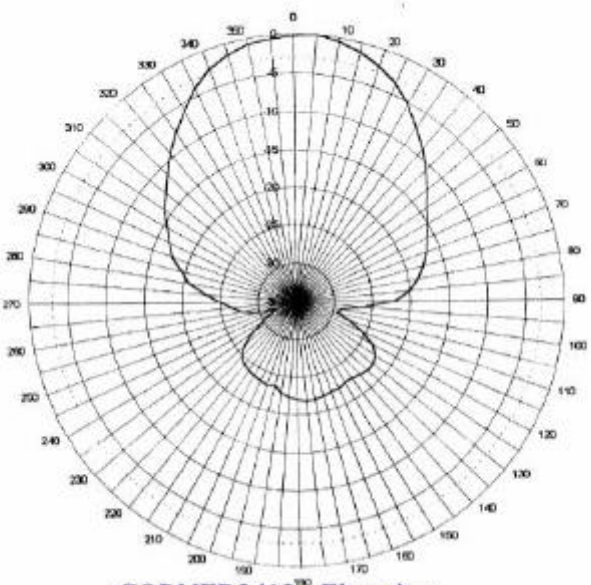
SPECIFICATIONS	**CORNER2414**
Frequency	2.4 GHz
Gain	14 dBi
Bandwidth @ 2:1 SWR	>200 MHz
Nominal Impedance	50 Ohms
Maximum Power	100 Watts
Vertical Beam Width	44 Degrees
Horizontal Beam Width	35 Degrees
Front-To-Back Ratio	>22 dB
Aperture	7” (17.8 Cm) X 10.5” (26.7 Cm) Front Face
Panel Size	7” (17.8 Cm) X 7” (17.8 Cm)
Wind Velocity (Maximum)	100+ Mph (160+ Kph)
Lightning Protection	DC Grounded; External Recommended
Material (Radome)	ABS Plastic
Material	Aluminum (Irridited)
Weight	<2.0 Lbs. (.9 Kg)
Mounting	Pole, Surface & Corner Mount
Interface Connector	“N” Female (Rear of Antenna)
Mounting Hardware Kit	Included
Mounting Dimensions	Cylindrical Mast <2” (<5 Cm); Outside Dimensions



Cirronet, Inc. ¨ 5375 Oakbrook Parkway ¨ Norcross, Georgia 30093 ¨ USA
Phone: 678.684.2000 ¨ Fax: 678.684.2001 ¨ E-mail: mkting@digiwrls.com
http://www.cirronet.com



CORNER2412 - Azimuth



CORNER2412 - Elevation

Radiation Patterns – CORNER2414

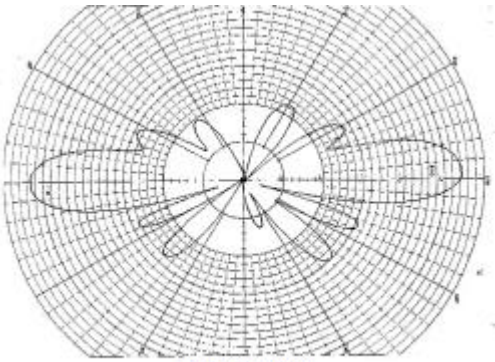
(Note: Above patterns incorrectly labeled – should be CORNER2414; not corner2412)

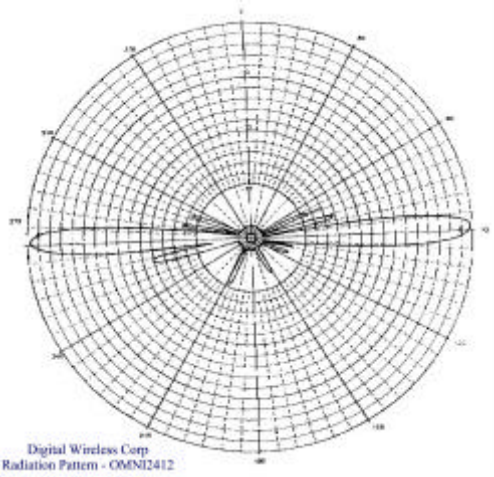
Cirronet, Inc. ¨ 5375 Oakbrook Parkway ¨ Norcross, Georgia 30093 ¨ USA
Phone: 678.684.2000 ¨ Fax: 678.684.2001 ¨ E-mail: mkting@digiwrls.com
http://www.cirronet.com

Omni Directional Gain Antennas (Exterior)
Specifications

SPECIFICATIONS	OMNI249	OMNI2412
Frequency	2.4 GHz	2.4 GHz
Gain	9 dBi	12 dBi
Bandwidth @ 2:1 SWR	140 MHz	85 MHz
Nominal Impedance	50 Ohms	50 Ohms
Max. Continuous Power	100 Watts	100 Watts
Vertical Beam Width	14 Degrees	7 Degrees
Wind Loading (Flat Plate Equivalent)	30 Sq. In. (193.5 Sq.Cm)	40 Sq. In. (258 Sq. Cm)
Rated Wind Velocity	100+ Mph (160+ Kph)	100+ Mph (160+ Kph)
Lightning Protection	External Suggested	External Suggested
Material (Radome)	Polycarbonate	Polycarbonate
Material (Feed)	Aluminum	Aluminum
Length	27 In. (68.5 Cm)	41 In. (104 Cm)
Weight	2.0 Lbs. (.9 Kg)	2.5 Lbs. (1.1 Kg)
Antenna Diameter	1 In/2.5 Cm	1 In/2.5 Cm
Interface Connector	"N" Female	"N" Female
Mounting Kit	Included	Included
Mounting Dimensions	Cylindrical Mast <2" (<5 Cm)	Cylindrical Mast <2" (< 5 Cm)

Cirronet, Inc. ¨ 5375 Oakbrook Parkway ¨ Norcross, Georgia 30093 ¨ USA
Phone: +678.684.2000 ¨ Fax: +678.684.2001 ¨ E-mail: indust@cirronet.com





Radiation Pattern's

OMNI249

OMNI2412

Cirronet, Inc. ¨ 5375 Oakbrook Parkway ¨ Norcross, Georgia 30093 ¨ USA
Phone: +678.684.2000 ¨ Fax: +678.684.2001 ¨ E-mail: indust@cirronet.com

CORNER249 SPECIFICATIONS

- *Frequency: 2.300—2.600 GHz*
- *Bandwidth @ 2:1 VSWR: <200 Mhz*
- *Impedance: 50 Ohms, nominal*
- *Maximum power: 100 Watts*
- *Vertical beam width: 75°*
- *Horizontal beam width: 65°*
- *Front-to-back ratio: <22dB*
- *Lightning: DC grounded; external protection recommended*
- *Aperture: 3" x 5.5" (front face)*
- *Aperture panel size: 3" x 3"*
- *Material: Powder coated aluminum*
- *Radome: ABS plastic*
- *Weight: 1 Lb.*
- *Max. Wind Velocity: 100+ mph*
- *Connector: Female "N"*
- *Mounting: Round mast; surface and corner*
- *Mounting Dimension: Up to 2" OD mast*
- *Mounting hardware: Included*
- *Mounting hardware material: Stainless steel*

Features…

- **Small aperture**
- **Minimal wind resistance**
- **Universal mounting**
- **Split balun design provides:**
  - **High efficiency**
  - **Pattern NOT skewed**
- **Rear connector feed point**
- **Half wavelength element**
- **High gain for small size**

CIRRONET

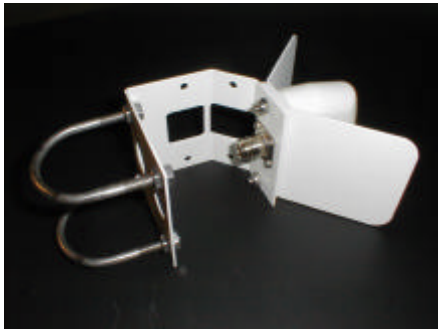
Cirronet, Incorporated

5375 Oakbrook Parkway
Norcross, GA 30093

Phone: +678.684.2000
Fax: +678.684.2001
Email: indust@cirronet.com

Corner Reflector Antenna….

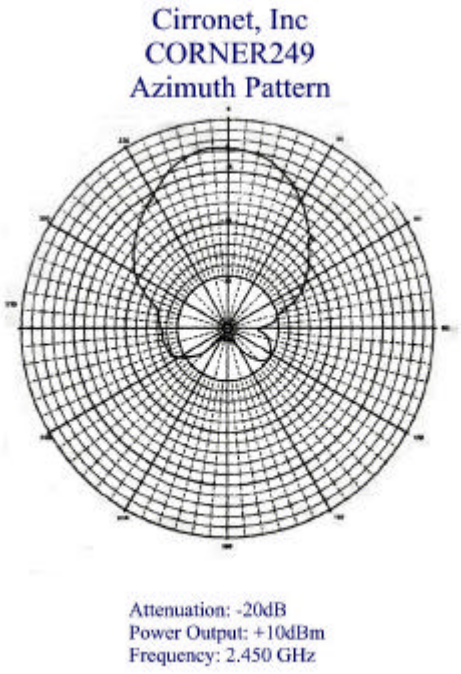
CORNER249 9dBi Gain



Cirronet, Incorporated

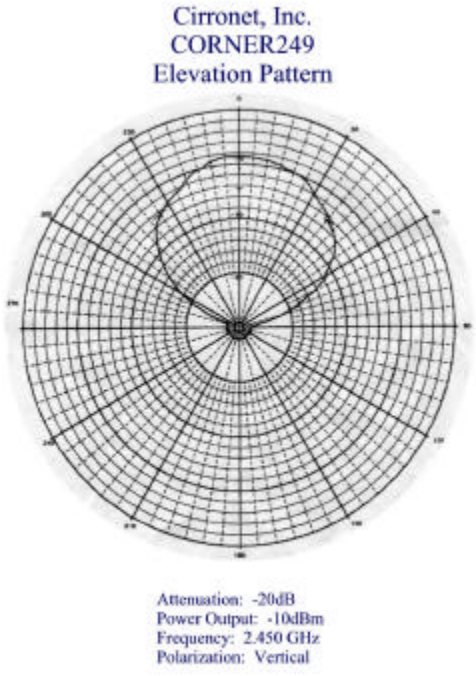
Tel: +678.684.2000

Cirronet™ Part No. CORNER249
Radiation Pattern
(Azimuth)



CIRRONET.

Cirronet™ Part No. CORNER249
Radiation Pattern
(Elevation)



CIRRONET.

Cirronet has a multitude of Wireless Data Transceivers & accessories available…

- WIT2410M "Pins Down" OEM Module for direct interface to your new design board
- WIT2410S "Pins Up" OEM Module for IDC Cable interface to your existing board
- HN-210—Remote Weatherproof Data Transceiver with built in 6 dBi antenna
- HN-510—Desk Top Indoor Data Transceiver with DB-9 RS-232 connector
- HN-1010—Outdoor weatherproof (NEMA) data transceiver
- HN-1510—Indoor ruggedized data transceiver with user selectable RS-232 & RS-485 interfaces
- HN-2010—Outdoor weatherproof (NEMA) repeater with internal standby power
- HN-3010—Outdoor weatherproof (NEMA) composite housing data transceiver with built in 6 dBi antenna and user selectable RS-232 & RS-485 interface
- Antennas for outdoor long range applications
- Antennas for outdoor medium range applications
- Antennas for indoor applications

Contact Cirronet for other useful accessories

Cirronet, Incorporated

5375 Oakbrook Parkway
Norcross, GA 30093

Phone: +678.684.2000
Fax: +678.684.2001
Email: indust@cirronet.com
www.cirronet.com

Wireless Components

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model SAS-RFM

2.4 GHz RFM Modem for Point-to-Point Communications

The SAS-RFM is a pole mount, 2.4 GHz frequency hopping, spread spectrum radio modem used to provide wireless networks of the SAS-1 multi-lane traffic detector, T-Box cabinet processors, cabinet controllers, and remote sensors. The **base station** is typically used as the base station for a network of sensors providing data to a roadside cabinet controller. The SAS-RFM services up to 7 SAS-1's for real time intersection applications, and polls up 62 individual devices (SAS-1's, T-Box's) on the same network hopping pattern, with up to 40 different hopping patterns available to eliminate interference between adjacent networks. The SAS-RFM can be used back-to-back to provide relay of data in non-line of site applications.

The SAS-RFB with mounted whip antenna

General Specifications and Features:

- Housed in a metal, 7.4"x4.7"x3.25" enclosure
- RS-232 Serial interface, Asynchronous CMOS signal at 3.3v; 5v tolerant
- Operating Temperature -20ºC to 70ºC
- 7.5 to 24 VDC input
- Selectable 10 or 100 MW output, outdoor ranges of 3000 ft with a dipole to >20 miles with gain antenna
- 12 mA standby, 50 mA typical, 200 mA peak (Tx) current consumption
- I/O Data rates of up to 230 Kbps, software selectable
- Supports point-to-point and point-to-multipoint modes
- FCC and ETSI certified for license free operation
- Shown here as a sealed unit with integral omni-whip antenna with N-Connector

Raven CDMA

We make wireless data work

About AirLink

AirLink is a leading wireless data solutions provider helping organizations put their remote commercial assets on line. AirLink's family of products include communications platforms, end-user software applications, intelligent clients, and APIs for integration with other enterprise application software.

The AirLink Raven CDMA continues the legacy started by the Raven CDPD in 1997. Thousands of Ravens are currently installed on CDPD networks with many different types of Remote Terminal Units (RTUs) in dozens of Telemetry/SCADA applications.

Telemetry Features:
- TCP/IP stack
- UDP/TCP PAD
- Protocol Conversions
- Dynamic IP Management
- Domain Name Addressable
- Remote Control

The AirLink Raven CDMA is a rugged, intelligent wireless data platform designed to enable real-time, two-way communications with remote assets. The AirLink Embedded Operating System (ALEOS) is the power inside the Raven. ALEOS has its own embedded TCP/IP stack which enables transmission of serial data from non-IP devices. ALEOS enables several functions including remote configuration and diagnostics, packet assembly and disassembly (PAD) for UDP or TCP, and telemetry protocol spoofing and conversion. The Raven CDMA is a powerful and versatile communications device.

AirLink offers a variety of solutions to enable many telemetry applications to operate in the dynamic IP addressing environment of CDMA/1XRTT networks. ALEOS, in conjunction with AirLink IP Manager, enables applications to address remote devices by name (e.g. remote1.ddns.company.com). This dynamic DNS (DDNS) function is done automatically and securely any time the IP of the device changes. AirLink IP Manager then updates a DNS server. ALEOS can update IP assignment to host applications in addition to or instead of the AirLink IP Manager.

The unique intelligence within ALEOS enables virtually any type of remote device to connect via the public CDMA/1XRTT network. It can be used to replace existing landline, private radio, CDPD, and circuit-switched installations.

Applications

Utilities
- Natural Gas Wellhead Monitoring
- C&I Meters
- Transmission Line Flow Meters
- Energy Management Systems

Transportation
- Traffic Measurement
- Traffic Control
- Variable Message Signs

Atmospheric/Environmental
- Weather Monitoring
- Irrigation Control
- Seismic Monitoring
- Water Level Monitoring

Primary/redundant connectivity for
- Automated Teller Machines
- Routers
- Enterprise Servers

Special Features:
- **Class I Div 2 (pending)**
- **High speed data transfer rate**
- **Full duplex transceiver**
- **Low power consumption**
- **Proven technology**
- **Compact size**
- **Rugged aluminum case**
- **LEDs show status of network operation**
- **Optional mounting brackets**

AirLink Communications
472 Kato Terrace
Fremont, CA 94539

info@airlink.com
www.airlink.com

Phone: 510-226-4200
Fax: 510-226-4299

10.7.03

AirLink Communications

Raven CDMA

We make wireless data work

Application Interfaces

Standard interfaces include:

AT command set.

Host TCP/IP stack communicates with Raven via PPP.

Windows 95/98/2000/NT/XP Dial Up Networking communicates with Raven using PPP.

Raven CDMA Specifications

RF Features:

- 224 mW RF output (+23.5 dBm)
- Full duplex transceiver
- Dual-band support for both 800 MHz cellular and 1.9 GHz PCS bands
- Adheres to CDMA authentication as specified in CDMA2000 1X

Packet Mode Features (1xRTT):

- Data rates up to 153.6 kbps (forward channel) and 76.8 kbps (reverse channel)

Power Specifications:

- Advanced Power Management features
- Low power consumption
- Input Voltage: 10 VDC to 28 VDC
- Input Current: 40 mA to 200 mA
- Typical Receive: 200ma at 12VDC
- Typical Transmit: Approximately 200ma at 12VDC
- Dormant connection [idle for 10-20 seconds]: 40 ma at 12 VDC

Environmental:

- Operating ranges: -30°C to +70°C
  (10% duty cycle limit above 60°C)
- Humidity: 5%-95% Non-condensing

Physical Characteristics:

- Weight: < 1 lb.
- Size: 3" wide x 1" high x 5.1" long
- Status LEDs
- RF Antenna Connector:
  50 Ohm TNC
- Serial Interface:
  RS232 DB-9F

Warranty:

- 1 year hardware parts and labor

AirLink Communications
472 Kato Terrace
Fremont, CA 94539

info@airlink.com
www.airlink.com

Phone: 510-226-4200
Fax: 510-226-4299

SAS Relay Interface Components

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model SAS-RI

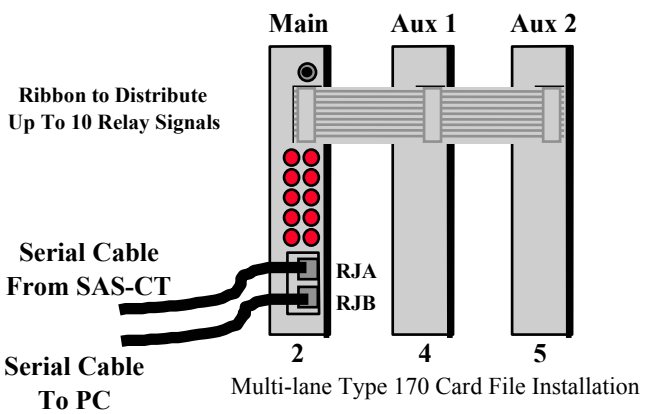
The SAS Relay Interface

SAS-RI-170
for Type 170 Or TS1 Card Files

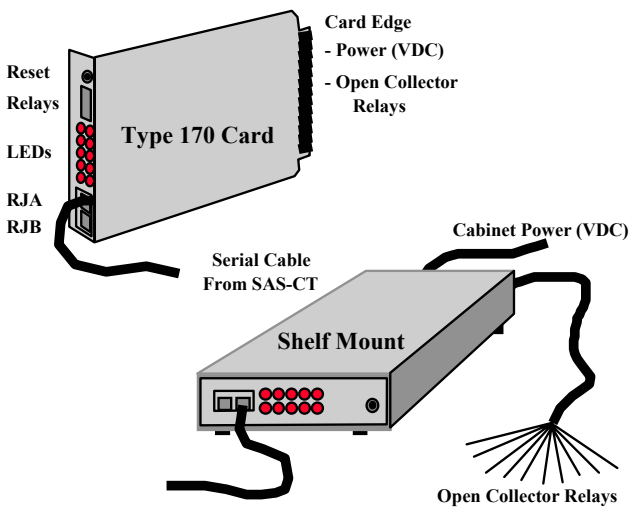
Key Features:

- **Up to 10 Relays with High Intensity LED Indicators (Zone Presence) on front panel**
- **22 position card edge or "pluggable" terminal interface (10 relays plus power)**
- **Shock NEMA TS2, Vibration NEMA TS2**
- **Operating Temperature -20 C to 75 C**
- **DC Powered (7.5 to 24 VDC)**
- **Type 170/TS1 version Dimensions 4 1/2"x 7 1/2" x 1 1/16". The footprint for the shelf mount is 5 1/2" x 1 1/2" x 5 9/16" with a Rugged, "Pluggable" Terminal Block Connector**

The SAS Relay Interface (SAS-RI) connects to the SAS Cabinet Termination (SAS-CT) using an RJ-45 to RJ-45 serial cable (RS-232). The function of the SAS-RI is to acquire the bit-serial relay message stream from the SAS-1 and convert the bit-serial relay signals to physical opto-coupled relay signals. High intensity LED's indicate true presence in the zone. These signals are open collector vehicle presence signals and are brought out on individual conductors or on a card edge connector. A jumper routing matrix allows any of the presence indicator 10 relays to be place to any of the 4 card-edge relay contacts. Routing of additional relays is via ribbon cable to optional daughter cards (SAS-RI-DAU) in adjacent slots. Dual RJ-45 ports provide sensor connection and PC setup.



Multi-lane Type 170 Card File Installation



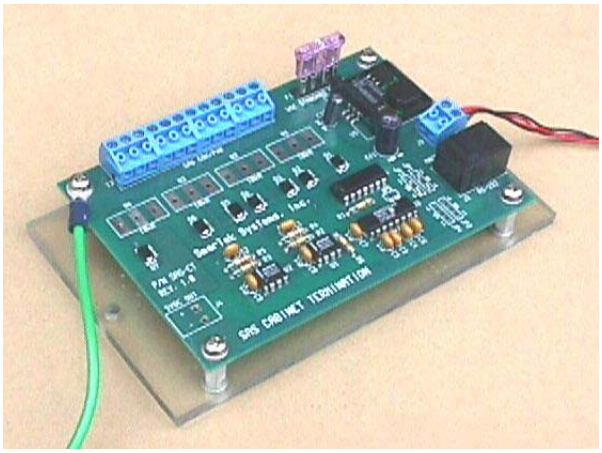
410-315-9727 sales@smarteksys.com www.smarteksys.com

SAS CT Cabinet Termination Options

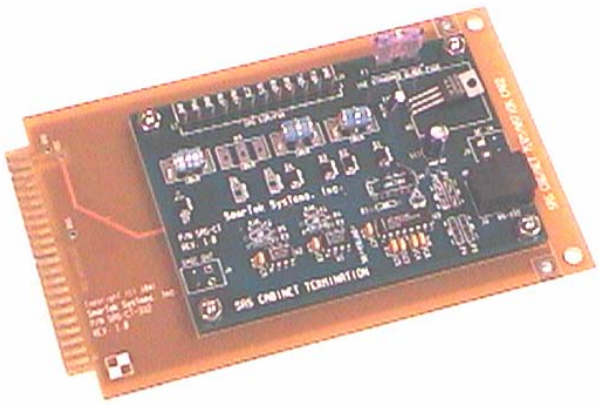
SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model SAS-1 CT

Cabinet Termination of Home Run Cable



Shelf or Back Panel Mount SAS-CT



Type 170/TS Card File SAS-CT

Cabinet Termination and Power Supply for SAS-1 Hardwired Systems and SAS-1 Base Station Radios

The SAS-1 CT is a small circuit card mounted inside the controller cabinet providing the termination point for the home run cable from the SAS-1 or remote SAS RF Modem. The home run cable is terminated with a high quality "pluggable terminal block connector" which is plugged onto the SAS-1 CT. The SAS-1 CT also provides electrical protocol conversion (RS-422/485 to RS-232) to facilitate connection to an RS-232 port of the cabinet controller, serial connection, or the RS-232 port of the SAS-Relay Interface (SAS-RI). The SAS-1 CT provides a single stage (solid state) and an additional stage (gas tube) of surge protection for all data and power lines.

- Shelf or Panel mount Dimensions 5"x3.5"x1.5"
- Type 170/TSS version Dimensions 4 1/2"x 7 3/8" x 15/16".
- RS-422/RS-485 to RS-232 Conversion of SAS-1 signals
- Solid State Surge on all Data and Power Lines
- Gas tube surge on all data and power lines
- 12 Position "pluggable" terminal block for SAS-1 Home Run
- RJ-45 RS-232 Connection for computer set-up of SAS-1 or connection to SAS-RI
- Fused Power input
- Shock NEMA TS2-2.1.10, Vibration NEMA TS2-2.1.9
- Operating Temperature -20 Deg C to 75 Deg C

410-315-9727 sales@smarteksys.com www.smarteksys.com

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Models SAS-1 JB & CAM JB

SAS-1 & CAM Junction Box

Large Junction Box, SAS-JB-Large, showing optional rear cable entry point

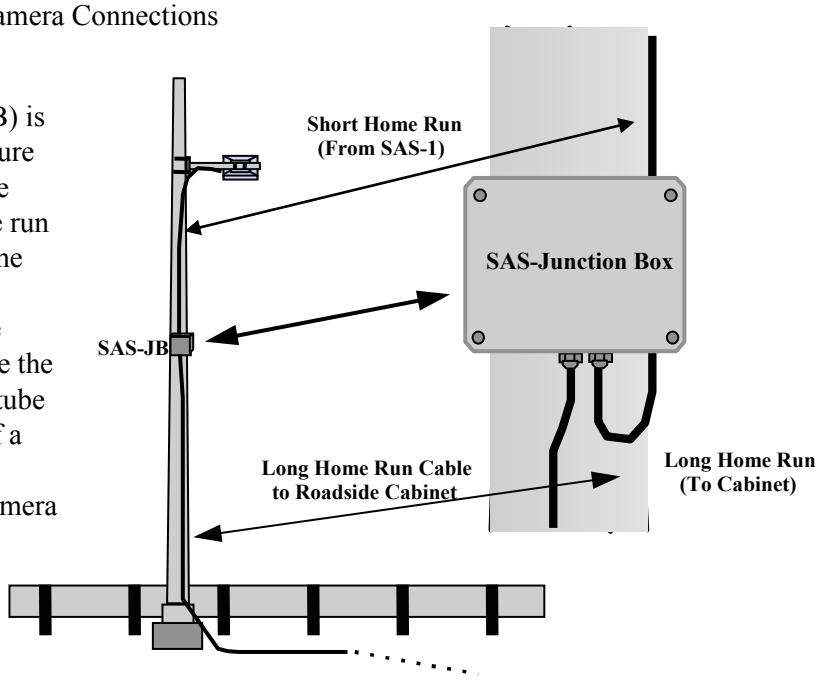
Small Junction Box, SAS-JB-Small showing bottom entry point

CAM Junction Box w/ mounted EX-10

SAS-1 and CAM Junction Box

- Cast Aluminum Junction Box with Stainless Band-It® Strap for easy attachment to poles and structures
- Water Tight, Bottom Entry Cable Strain Relief (Small & Large) or Optional rear cable entry for large version
- "Pluggable" Terminal Cable ends facilitate easy installation
- SAS-JB-Small Dimensions are 4 5/8"x 3 5/8" x 2 3/16" for single SAS-1
- SAS-JB-Large Dimensions are 7 3/8"x 4 11/16"x 3" for multiple SAS-1 connections
- Gas Tube Surge protection for SAS-1 and Camera Connections

The SAS-1 and CAM Junction Box (SAS-1 JB) is a small, strap-on, weather-tight NEMA enclosure which is mounted conveniently on the roadside structure . It is used to connect the short home run cable for up to 4 SAS-1s to a much longer home run cable if long runs to a roadside cabinet are required (note size differences available). The SAS-1 JB also provides the means to configure the SAS-1 system with an additional stage of gas tube surge protection across all lines near the top of a home run lead. The CAM-JB provides in-line coax surge protection as well as support for camera mounts at the camera as shown above.



410-315-9727 sales@smarteksys.com www.smarteksys.com

Mounting Equipment

Pole Bracket Hubs

Band-On / Bolt-On

47,000 lb. Tensile Strength Die-Cast Aluminum

PBH-400

- Band or Bolt-On for Wood Pole Mountings
- Single Horizontal 1½" Threaded Opening
- Mates with PBH-405 (right)

PBH-405

- Downward 1¼" Threaded Opening for Conduit Riser on Wood Pole Mounting
- Pipe Plugs Available for Downward Opening

PBH-420

- Narrow Back Style for Narrow Pole Mountings
- Furnished with or without ¼" - 20 Set Screw or ¾" Threaded Rear Opening
- Your Choice of 1½" NPSM or NPT Threaded Opening
- N.Y.C. Designation: *"Lawton Post Hub"*

PBH-425

- For Wide Pole Mountings
- Single 1½" NPSM Opening
- Rear Exit Hole is either ¾" - 14 NPSM or 1¼" - 11½ NPSM

Please specify powder-coated finish when ordering

General Traffic Equipment's Pole Bracket Hubs are for side pole mounting of both vehicle and pedestrian signal pipe bracket arms. Commonly called "pole plates", they are an alternative to the ornamental pole clamps. Hubs are fastened to a steel or aluminum pole using 3/4" stainless steel banding and buckles. The hubs eliminate the need to weld a coupling onto a steel pole to attach pipe arms. On a wood pole they may be fastened with lag screws. Please specify color when ordering. Stainless steel banding and buckles are available separately.

General Traffic Equipment Corporation

(845) 569-9000

TOLL FREE: (800) 222-2828

FAX: (845) 569-1800

E-MAIL: gtecorp@aol.com

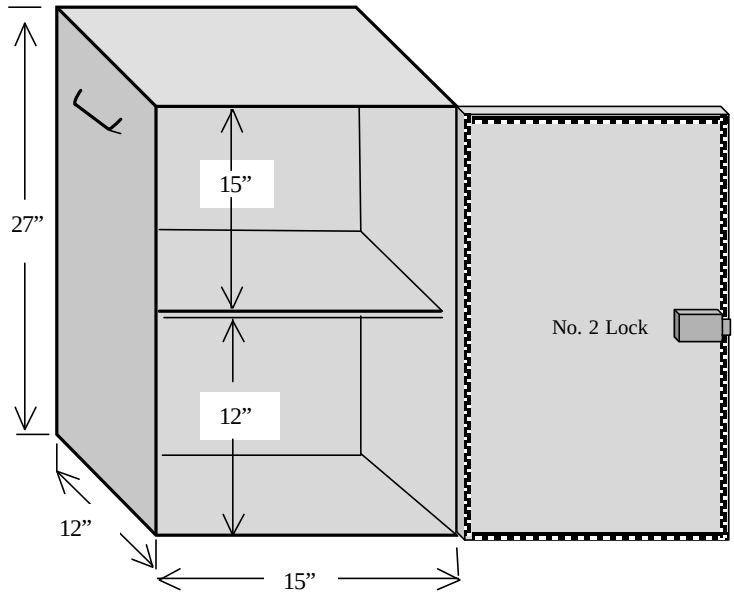
259 Broadway, Newburgh, NY 12550

MADE WITH PRIDE IN THE USA

Cabinets

NAZTECH TYPE II

TRAFFIC CONTROL CABINET



CABINET SPECIFICATIONS

MATERIAL - .125” THICK 5052 ALLOY SHEET ALUMINUM. ALL SURFACES TO HAVE MILL FINISH AS STANDARD FINISH.

DOOR & LOCK - DOOR HAS A 14 GAUGE STAINLESS STEEL CONTINUOUS HINGE, CLOSE CELL NEOPRENE GASKET AROUND THE ENTIRE DOOR FOR WATER INTEGRITY, A CORBIN #2 LOCK A KEY LOCKING SYSTEM

VENTILATION - VENT LOUVERS ONE LOUVER ON THE RIGHT SIDE 3” FROM THE BOTTOM OF THE CABINET, AND ONE LOUVER ON THE LEFT SIDE 2 1/2" FROM THE TOP OF THE CABINET

BACK PANEL – I5" FROM TOP OF CABINET CONSTRUCTED OF .125 ALUMINUM AND PUNCHED WITH 5/16" HOLES, I" FROM ALL FOUR CORNERS FOR MOUNTING BACK PANEL IN CABINET WITH 3/16" STAINLESS STEEL SCREWS

NOTE: CABINET DIMENSIONS MAY VARY PLUS/MINUS ONE INCH

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions
410-315-9727
gpieper@smarteksys.com
www.smarteksys.com

Sensor Interfaces

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model USI2K

Universal Sensor Interface (USI)

General Description

The SmarTek Systems, Inc. Universal Sensor Interface (USI) is a low cost and rugged programmable interface used to provide a custom interface between various remote sensors (traffic, weather, temperature, etc.) and a standardized Remote Processing Unit (RPU). By using the USI to poll for and/or service periodic sensor measurement messages and then communicating with the cabinet RPU, software and processing functions in the RPU can be kept generic (traffic flow, weather information, etc.) independent of sensor type, model, or brand. The USI requires little power and has a very small foot print. The USI is completely programmable with sufficient amounts of RAM and non-volatile Flash Memory to make it quite flexible as an custom interface or in certain applications as a stand alone cabinet processor.

Physical

Size……..5.5 in W x 5.5 in D x 1.5 in H
Operating Temperature……-35 deg C to 75 deg C
Enclosure…….Enamel Coated Steel and Aluminum for Shelf Mount

Memory

RAM…….128 K or 512 K Bytes
Flash……..256 K Bytes

Signal Interfaces

2-RS-232 with RJ-45 Jacks
Aux……Rx, Tx, Gnd
Sys……..Rx, Tx, Gnd, DCD, DTR, DSR, RTS, and CTS
Micro-LAN "One Wire" Sensor Interface (Solid State and Gas Tube Surge Protected)
4-Opto-Isolated Open Collector/Common Emitter Relay Outputs

Display

10 Software Programmable Front Panel LEDs

Power

Input Voltage ....…….8 to 24 VDC
Output Voltage……5 VDC 1 Amp (Solid State and Gas Tube Surge Protected)
Required Power .....Less than 1 Watt
DTR Controlled Power Cycle/Reset Function

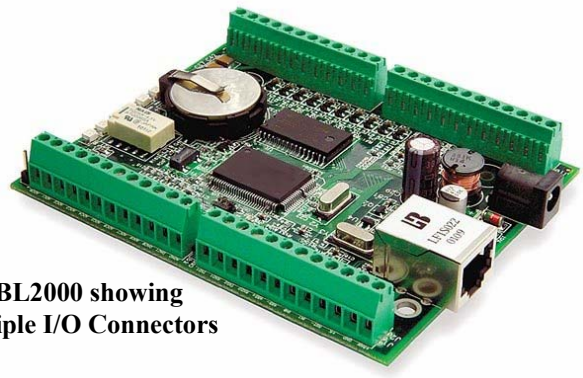
Clock

Battery-Backed Real Time Clock

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Model STS-BL2000

STS-BL2000 Cabinet Processor



STS-BL2000 showing Multiple I/O Connectors

STS-BL2000 with Protective Cover in Place

General Description

The SmarTek Systems, Inc. STS-BL2000 is a low cost and rugged programmable interface used as a custom interface between various remote sensors (loop detectors, traffic, weather, temperature, etc.) and a standardized Remote Processing Unit (RPU) or for use as a stand alone cabinet processor. By using the STS-BL2000 to poll for and/or service periodic sensor measurement messages and then communicating with the cabinet RPU, software and processing functions in the RPU can be kept generic (traffic flow, weather information, etc.) independent of sensor type, model, or brand. The STS-BL2000 requires little power and has a very small foot print. The STS-BL2000 may be used as a flexible custom interface for loop detectors and other devices without a serial data stream. All components are on a compact board for easy integration and roadside installation. The STS-BL2000 provides cost effective data collection, cabinet processing and data archiving without having to utilize the full power of a T-Box at sites where image capture is not an option.

Physical

Size……..4.9 in W x 5.6 in D x 1.1 in H
Operating Temperature……-40 deg C to 70 deg C
Humidity……...5–95%, non-condensing
Shelf mount, high impact black plastic enclosure

Memory

SRAM…….128 K Bytes
Flash……..256 K Bytes

Signal Interfaces

Serial Ports 3 total:
1 Aux……Rx, Tx, Gnd
1 Sys……..Rx, Tx, Gnd, DCD, DTR, DSR, RTS, and CTS or 2 Rx, Tx, Gnd
7 Dual-Purpose Analog or Digital Inputs at 12 kW, 10-bit resolution, 0–48 V DC
1 Relay Output SPDT, 1 A @ 30 V DC, 0.3 A @ 120 V AC

Display

None except a blinking activity LED

Power

Input Voltage ....…….9 to 40 VDC
Required Power ..... Less than 1.5 Watts

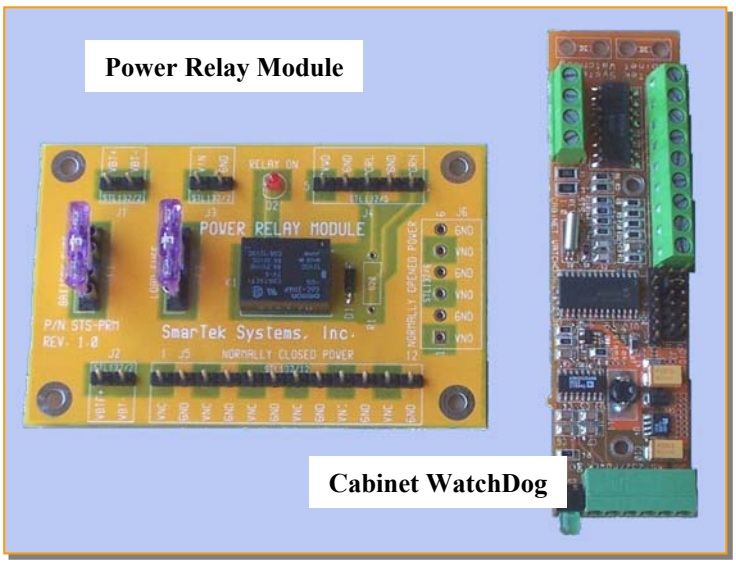
Clock

Battery-Backed Real Time Clock

SmarTek Systems, Inc.
Sensors and Systems Integration Solutions

Models CWD and PRM

Cabinet Watchdog & Voltage Monitor
Power Relay Module Combination



Cabinet WatchDog

Physical:
Size ... 4.5”x 1.25”x0.5”
Operating Temperature…-55 deg C to 125 deg C

Power

Input Voltage ……..8 to 34 VDC
Required Power .....Less than 1.0 Watts

Power Relay Module

Physical
Size . . . 4”x 2.6”x 1”

Fuses
Up to 10 Amp Blade Fuses

Relay
8A, 24 V SPST-NO/NC, 12VDC, 720ohm Coil

The Cabinet Watchdog (CWD) and Voltage Monitor is used to provide cabinet voltage measurements and watchdog services. The CDW can sample up to 4 different DC analog voltages (0 to 25.6 VDC). The sample rate for each channel is 10 samples per second and is averaged to 1 sample per second. The CWD can sample up to 2 opto-isolated relay inputs (5 VDC to 24 VDC) and up to 6 TTL level inputs. The sample rate for the digital channels is 10 samples per second. The states of the digital inputs are accumulated for 1 second and the majority is used to determine the on or off state at a 1 sample per second rate. The CWD has 2 opto-isolated relay outputs for driving external mechanical relays. These relays can be used with the Power Relay Module to control cabinet power. The output relays are open collector, and can sink up to 30 milliamps with a maximum collector voltage of 30 volts. In Polled Mode, the CWD provides a watchdog function and expects to receive at least 1 polling request per hour. If the request is not received, the opto-isolated relay outputs are activated (active low) in sequence.

The Power Relay Module is used to distribute and provide protective fuses for battery and cabinet power busses. It also has a mechanical relay which maybe controlled by the Cabinet Watchdog for cabinet reset or similar functions.

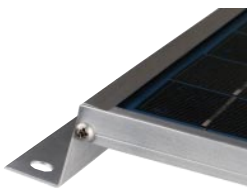
410-315-9727 sales@smarteksys.com www.smarteksys.com

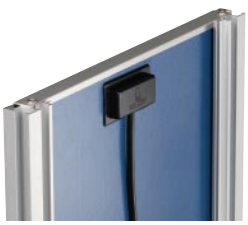
Optional Solar Power Supply (and Accessories)

SOLAREX

SX-40
SX-50
Photovoltaic Modules

SX-40 and SX-50 photovoltaic modules are part of Solarex's new SX™ module series, providing cost-effective photovoltaic power for DC loads with many energy requirements. With 36 polycrystalline cells in series, they charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.





Top: DirectMount™ frame. Center: MultiMount™ frame. Bottom: Universal frame.

Typical commercial applications of these modules, which generate peak power of 40 watts and 50 watts respectively, include remote telemetry, instrumentation systems, security sensors, and land-based navigation aids. They are also well-suited to providing subsistence power to homes in remote areas without utility (mains) service. They are available in three configurations: the **M** configuration, which includes the versatile MultiMount™ frame and a 15-foot output cable; the **D** configuration, which mounts directly to many surfaces without additional hardware; and the **U** configuration, which includes the heavy-duty Universal frame and a high-volume junction box with dual-voltage output.

The SX-40M and SX-50M

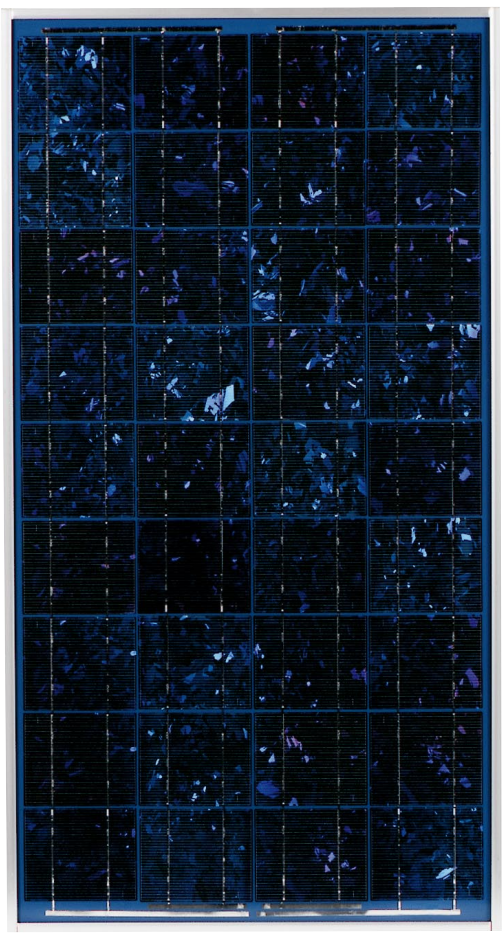
The SX-40M and -50M are general-purpose PV modules suitable for applications compatible with the MultiMount™ frame and the modules' electrical characteristics. They are for use in single-module applications with DC system voltage not exceeding 30 volts.

MultiMount™ Frame

The MultiMount™ frame of the SX-40M and -50M provides tremendous flexibility in mounting approach. Oriented parallel to the edge and back of the module, its dual channels accept the heads of 5⁄16" or 8mm hex bolts, allowing the module to be mounted from the side or back. Bolts may be located anywhere along the channels (shown at left with end caps removed), a configuration which prevents them from turning during tightening and allows installation with just one wrench.

Complete, Factory-Wired

Output of the **M** configuration is via a 15-foot (4.6m) PVC-jacketed AWG 14-2 cable which terminates in a low-profile junction box on the module back. Epoxy-potted in the box, module electrical connections are sealed against corrosion and effectively strain-relieved. Output voltage is compatible with 12VDC systems.



SX-50U

The Natural Source for Electricity™

Solarex SX-40 and SX-50 modules are ideally suited for modest power requirements in remote areas such as this home lighting system in Nepal.

630 Solarex Court
Frederick
Maryland 21703
www.solarex.com
Phone: (301) 698-4200
Fax: (301) 698-4201

6047-1 4/99

The SX-40D and SX-50D

The DirectMount™ frame of the SX-40D and -50D enables these modules to be mounted on many surfaces (roofs, walls, etc.) with no need for mounting hardware beyond four fasteners appropriate for the surface and material. They are easily and inexpensively installed on remote dwellings to provide limited electric power. Their electrical output circuitry and limitations are identical to the **M** configuration modules.

The SX-40U and SX-50U

The SX-40U and -50U are designed primarily for industrial use and other particularly demanding applications. Their rugged Universal frame is suitable for severe duty, exceeds the requirements of all certifying agencies, and is fully supported by Solarex's IntegraSystem™ system integration concept, which ensures full compatibility with other Solarex subsystems (support hardware, regulators, etc.). These modules are suitable for single- or multiple-module applications with DC system voltage not exceeding 600 volts.

Dual Voltage Capability
All SX-40 and -50 modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. In the SX-40U and -50U junction box, the strings may be field-wired in series (providing 12V nominal output) or in parallel (providing 6V nominal output.)

High-Capacity Versatile Junction Box
The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts ½" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm^2); standard terminals accept up to AWG #10 (6mm^2);
- a Solarstate™ charge regulator.

The SX-40U and -50U are certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC. They are approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.

TÜV Rheinland

FM APPROVED

Performance and Workmanship Warranted

The materials, workmanship and performance of every SX-40 and SX-50 module are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating).

UL®

Quality Certified

SX-40 and -50 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between –40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics[1]

	SX-40	SX-50
Maximum power (P_{max})	40W	50W
Voltage at P_{max} (V_{mp})	16.8V	16.8V
Current at P_{max} (I_{mp})	2.37A	2.97A
Guaranteed minimum P_{max}	36W	45W
Short-circuit current (I_{sc})	2.58A	3.23A
Open-circuit voltage (V_{oc})	21.0V	21.0V
Temperature coefficient of I_{sc}	(0.065±0.015)%/°C	
Temperature coefficient of V_{oc}	–(80±10)mV/°C	
Temperature coefficient of power	–(0.5±0.05)%/°C	
NOCT[2]	47±2°C	

Notes

1. These specifications represent the performance of typical 12V modules as measured at their output terminals (or cable termination), and do not include the effect of such additional equipment as diodes. The specifications are based on measurements made in accordance with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:

   - illumination of 1 kW/m² (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
   - cell temperature of 25°C.

   For characteristics of modules in 6V configuration, divide the 12V voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.

2. When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C, solar irradiation of 0.8 kW/m², and wind speed of 1 m/s.

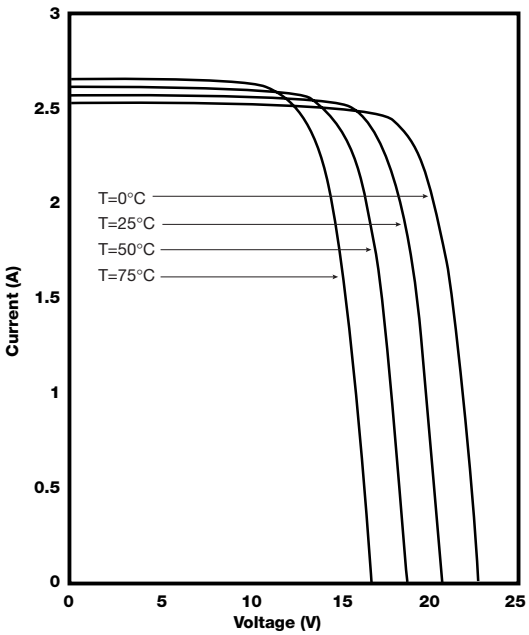
3. These specifications do not include the effect of light-induced degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

Mechanical Characteristics

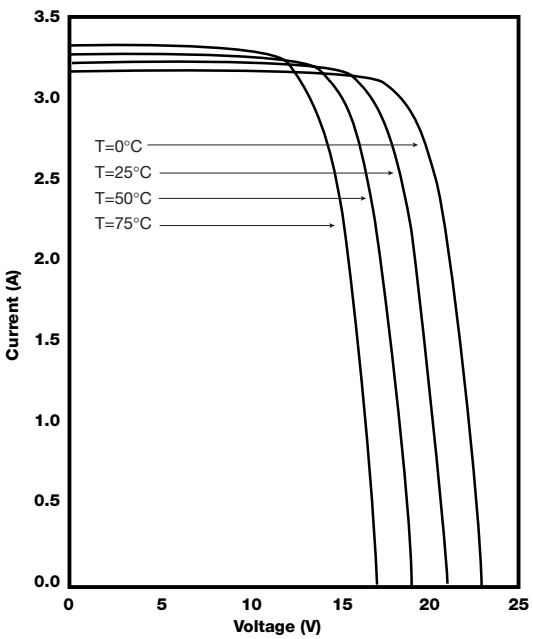
Weight

SX-40M, SX-40D	10.6 pounds (4.9 kg)
SX-40U	11.8 pounds (5.4 kg)
SX-50M, SX-50D	12.5 pounds (5.7 kg)
SX-50U	13.9 pounds (6.3 kg)

SX-40 I-V Curves

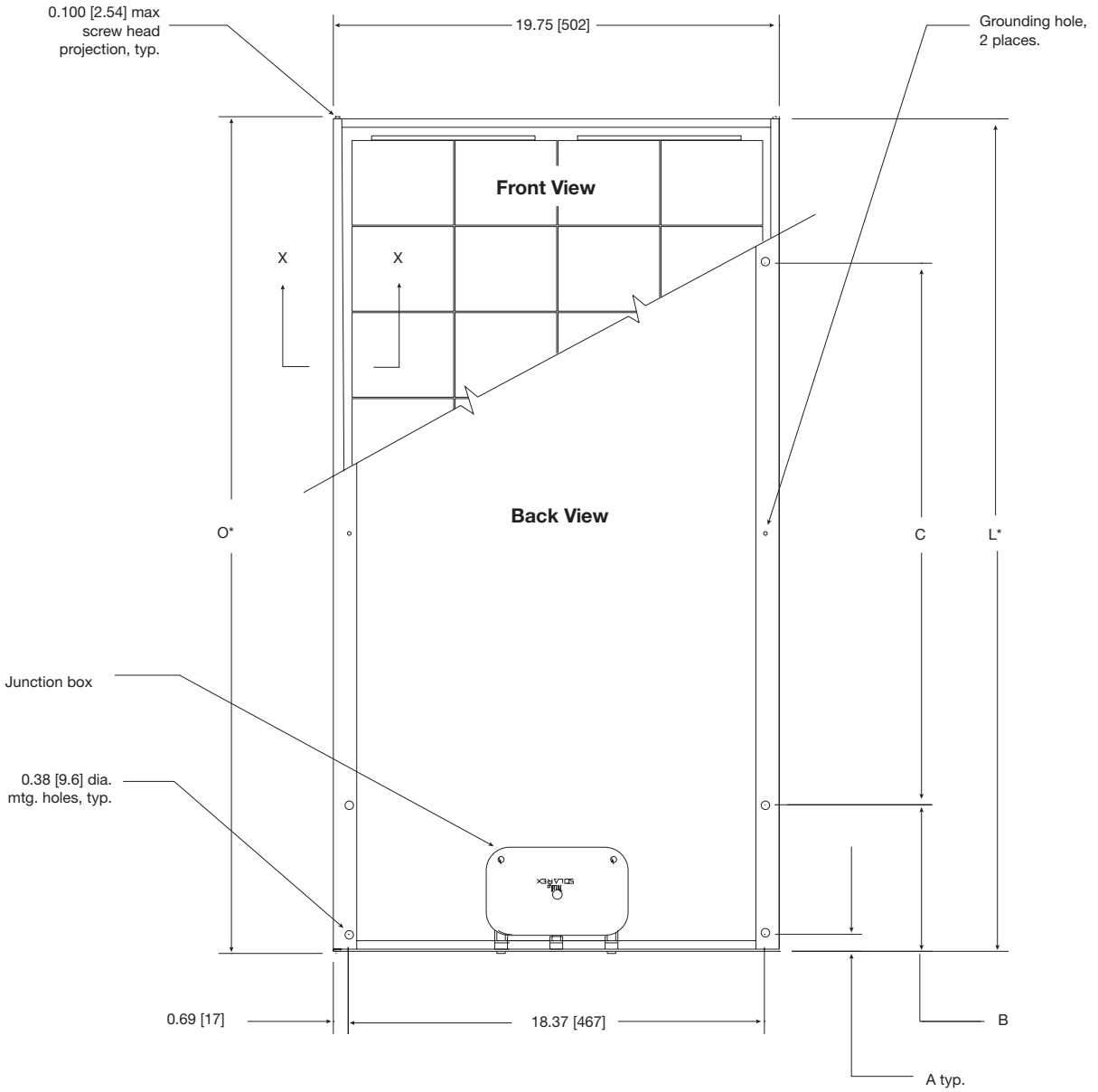


SX-50 I-V Curves



Dimensions

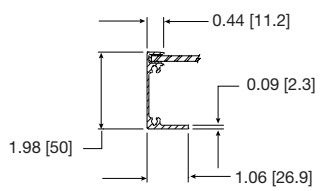
Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances ±1/8" (3mm)



SX-40U, SX-50U

	O*	L*	A	B	C
SX–40U	30.20* [767]	30.00* [762]	7.00 [178]	15.00 [381]	
SX–50U	36.97* [939]	36.77* [934]	0.69 [17]	6.39 [162]	24.00 [610]

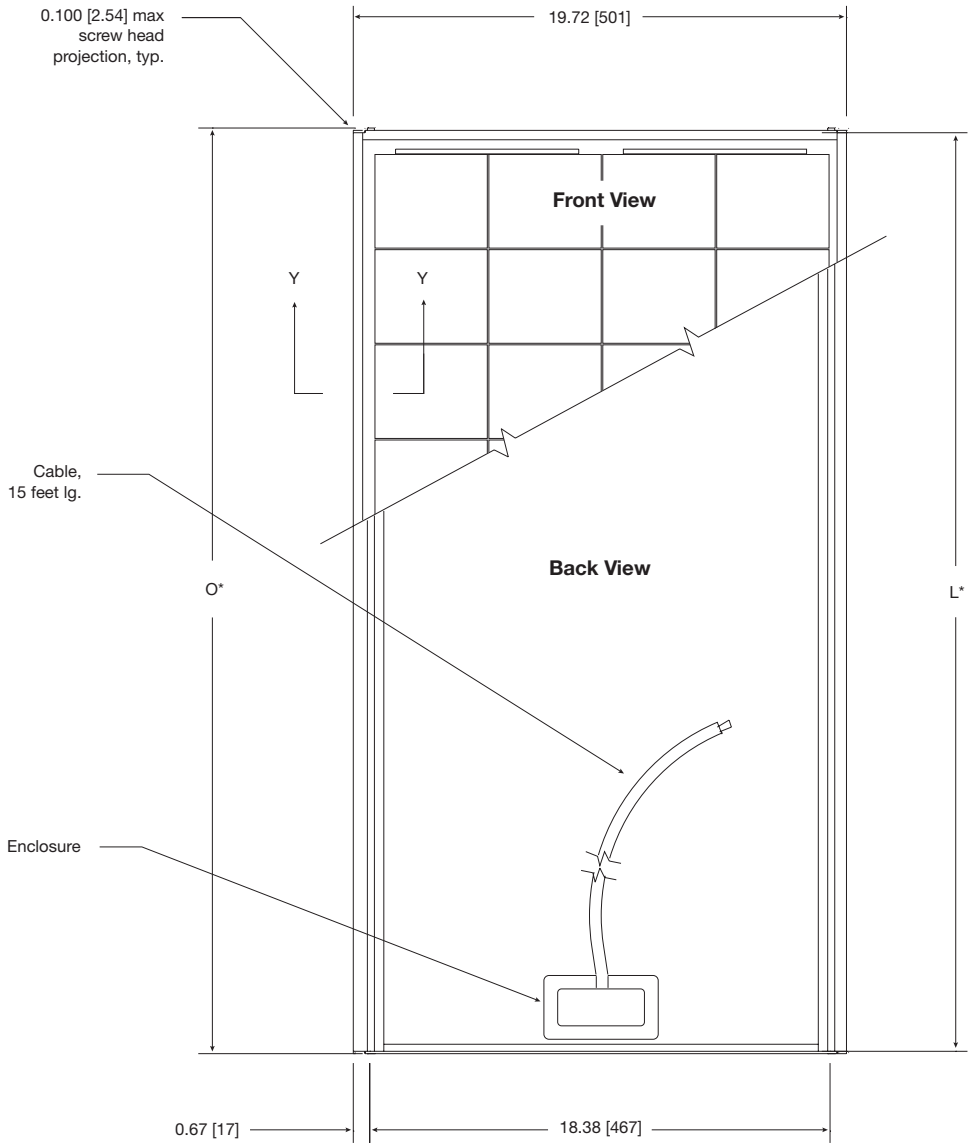
Note:
* "O" dimensions include 0.100 [2. 54] max. screw head projection on each end.
"L" dimensions do not include screw head projection.



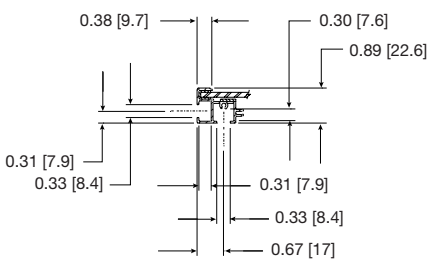
Section X-X

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches.
Overall tolerances ±1/8" (3mm)



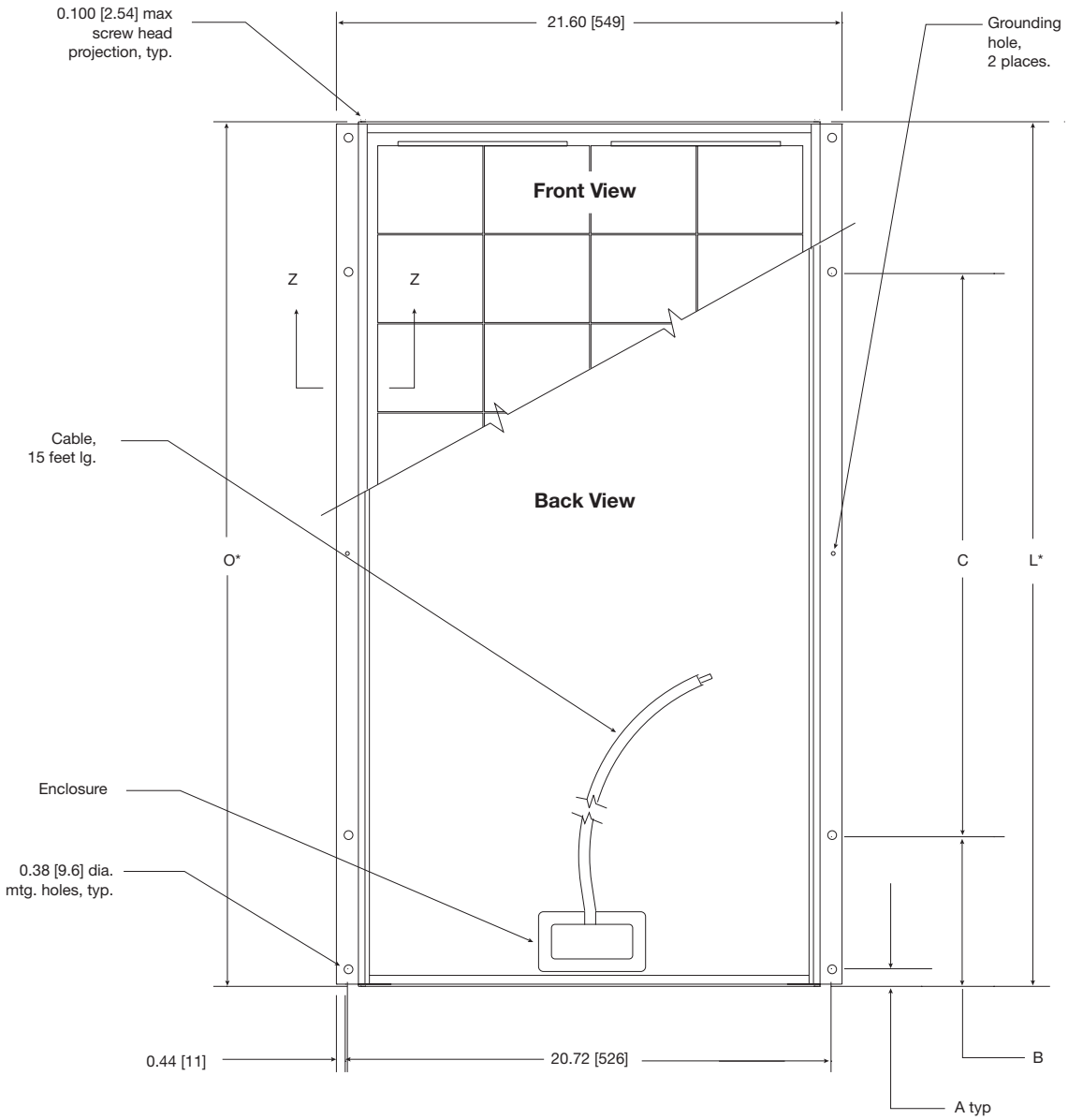
SX-40M, SX-50M



Section Y-Y

	O*	L*
SX–40M	30.08* [764]	29.88* [759]
SX–50M	36.93* [938]	36.73* [933]

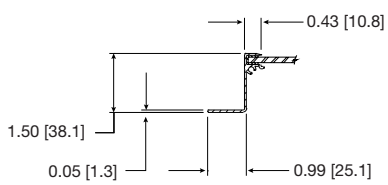
Note:
* "O" dimensions include 0.100 [2. 54] max. screw head projection on each end. "L" dimensions do not include screw head projection.



SX-40D, SX-50D

	O*	L*	A	B	C
SX–40D	30.11* [765]	29.91* [760]	6.96 [177]	14.96 [380]	
SX–50D	36.95* [938]	36.75* [934]	0.68 [17]	6.38 [162]	24.00 [610]

Note:
* “O” dimensions include 0.100 [2. 54] max. screw head projection on each end.
“L” dimensions do not include screw head projection.



Section Z-Z

SOLAREX

SX-55, SX-60 and SX-65

Photovoltaic Modules

SX-55, SX-60 and SX-65 photovoltaic modules are part of Solarex's new SX™ module series, providing cost-effective photovoltaic power for general use. They operate DC loads directly or, in an inverter-equipped system, AC loads. They are suitable for single or multiple-module systems and, with 36 polycrystalline cells in series, charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.

Top: DirectMount™ frame. Bottom: Universal frame.

Applications of these modules, which generate peak power of 55 watts, 60 watts and 65 watts respectively, encompass virtually all applications where photovoltaics are a feasible energy source, including telecommunication systems, pumping and irrigation, cathodic protection, remote villages and homes, and land-based navigation aids. They are available in two configurations: the **D** configuration, which mounts directly to many surfaces without additional hardware; and the **U** configuration, which includes the heavy-duty Universal frame and a high-volume junction box with dual-voltage output.

The SX-55D, SX-60D and SX-65D

The DirectMount™ frame of the SX-55D, -60D, and -65D enables these modules to be mounted on many surfaces (roofs, walls, etc.) with no need for mounting hardware beyond fasteners appropriate for the surface and material. They are easily and inexpensively installed on remote dwellings to provide limited electric power.

Complete, Factory-Wired

Output of the **D** configuration is via a 15-foot (4.6m) PVC-jacketed AWG 14-2 cable which terminates in a low-profile junction box on the module back. Epoxy-potted in the box, module electrical connections are sealed against corrosion and effectively strain-relieved. Output voltage is compatible with 12VDC systems, and the module is suitable for use in systems with system DC voltage up to 30 volts.

The SX-55U, SX-60U and SX-65U

The **U** configuration modules are designed primarily for industrial use and other particularly demanding applications. Their rugged Universal frame is suitable for severe duty, exceeds the requirements of all certifying agencies, and is fully supported by Solarex's IntegraSystem™ system integration concept, which ensures full compatibility with other Solarex subsystems (support hardware, regulators, etc.). These modules are suitable for single- or multiple-module applications with system DC voltage not exceeding 600V (U.S. NEC rating) or 1000V (per TÜV Rheinland.)

SX-60U

The Natural Source for Electricity™

Solarex's polycrystalline silicon modules require much less energy to manufacture than comparable monocrystalline products, giving a significantly faster energy payback and larger lifetime contribution of green energy.

630 Solarex Court
Frederick
Maryland 21703
www.solarex.com
Phone: (301) 698-4200
Fax: (301) 698-4201

6048-1 4/99

Dual Voltage Capability
All SX-55, -60, and -65 modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. In the SX-55U, -60U and -65U junction box, the strings may be field-wired in series (providing 12V nominal output) or in parallel (providing 6V nominal output.)

High-Capacity Versatile Junction Box

The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts ½" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm^2); standard terminals accept up to AWG #10 (6mm^2);
- a Solarstate™ charge regulator.

The SX-55U, -60U and -65U are certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC. They are approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.

Performance and Workmanship Warranted

The materials, workmanship and performance of the SX-55, -60 and -65 are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating).

Quality Certified

SX-55, -60, and -65 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between –40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics[1]

	SX-55	SX-60	SX-65
Maximum power (P_{max})	55W	60W	65W
Voltage at P_{max} (V_{mp})	16.5V	16.8V	17.2V
Current at P_{max} (I_{mp})	3.33A	3.56A	3.77A
Guaranteed minimum P_{max}	50W	55W	60W
Short-circuit current (I_{sc})	3.69A	3.87A	4.06A
Open-circuit voltage (V_{oc})	20.6V	21.0V	21.5V
Temperature coefficient of I_{sc}	(0.065±0.015)%/°C		
Temperature coefficient of V_{oc}	–(80±10)mV/°C		
Temperature coefficient of power	–(0.5±0.05)%/°C		
NOCT[2]	47°±2°C		

Notes

1. These specifications represent the performance of typical 12V modules as measured at their output terminals (or cable termination), and do not include the effect of such additional equipment as diodes. The specifications are based on measurements made in accordance with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:

   - illumination of 1 kW/m² (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
   - cell temperature of 25°C.

   For characteristics of modules in 6V configuration, divide the 12V voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.

2. When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C, solar irradiation of 0.8 kW/m², and wind speed of 1 m/s.

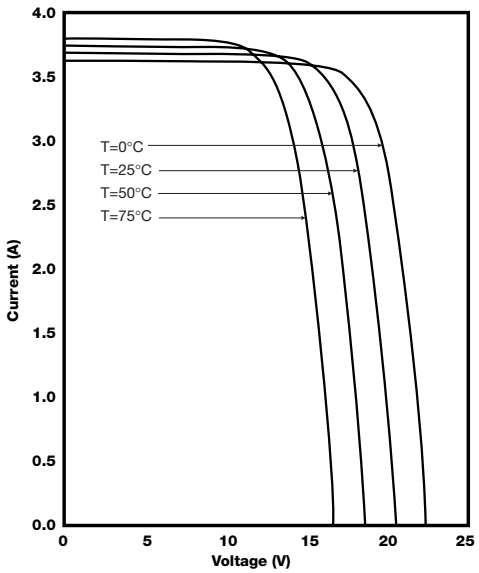
3. These specifications do not include the effect of light-induced degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

Mechanical Characteristics

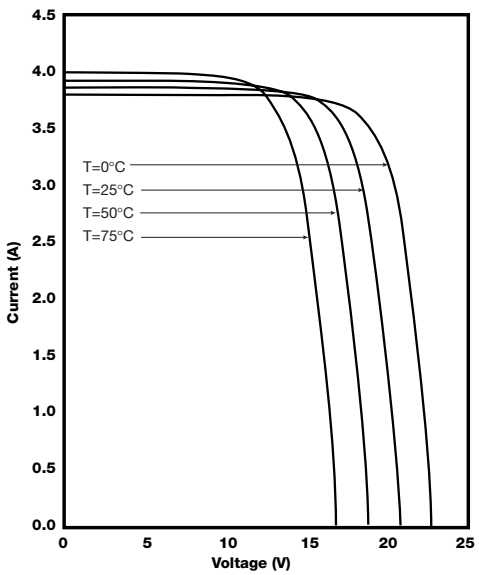
Weight

D configurations	14.4 pounds (6.5 kg)
U configurations	15.9 pounds (7.2 kg)

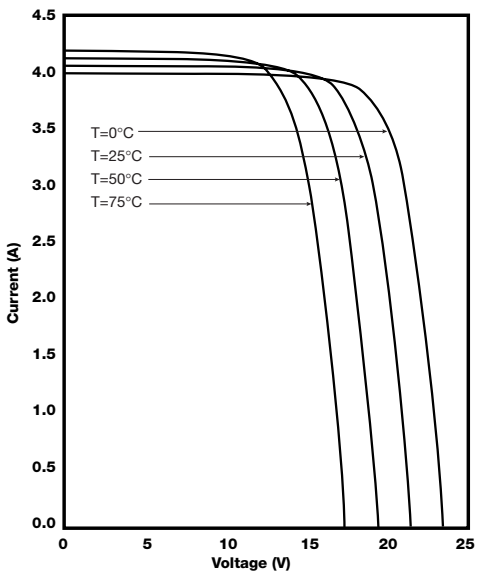
SX-55 I-V Curves



SX-60 I-V Curves

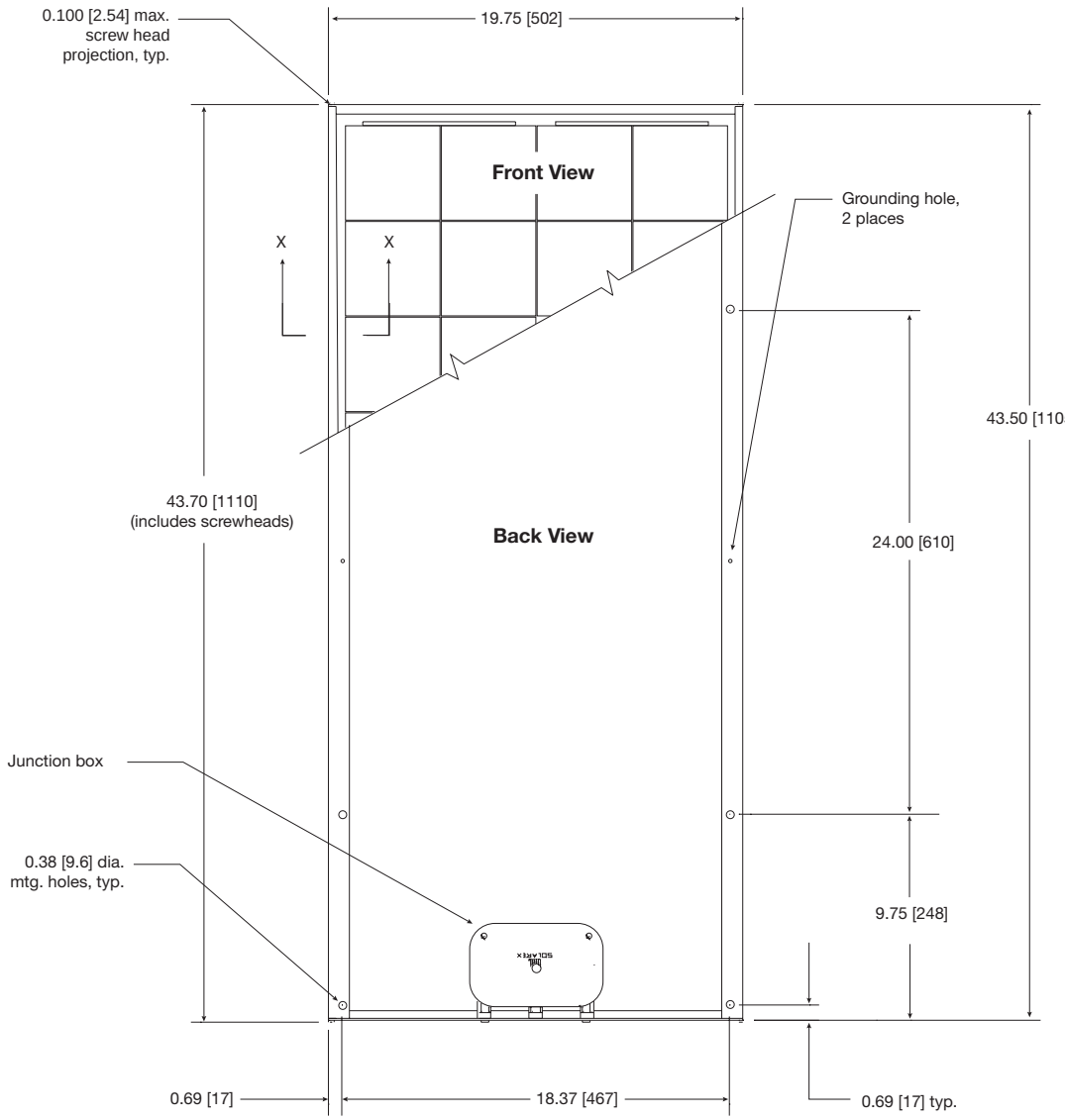


SX-65 I-V Curves

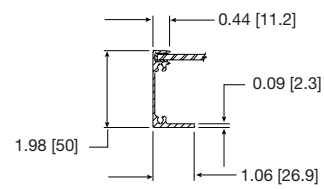


Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances ±1/8" (3mm)



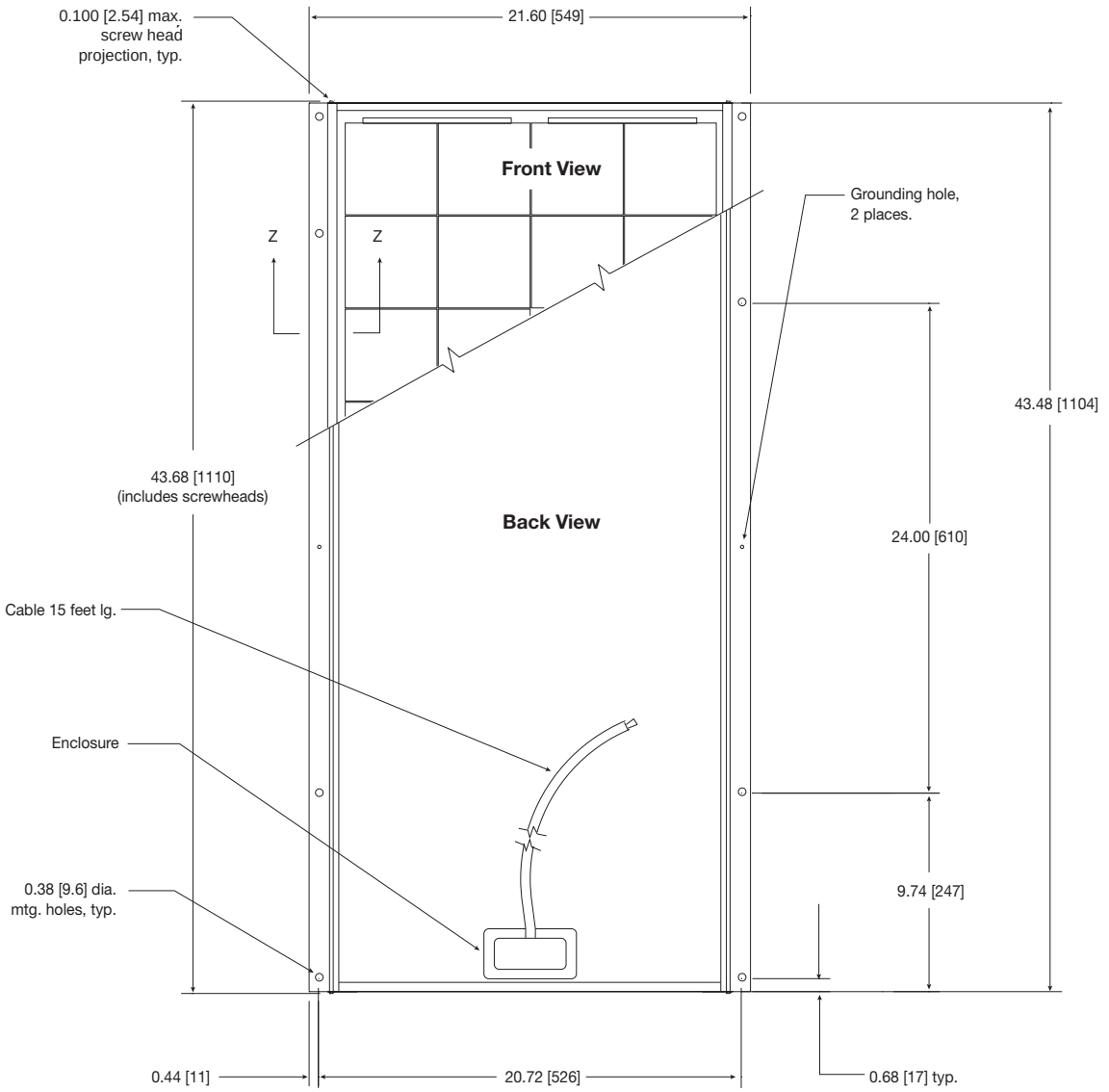
SX-55U, -60U, -65U



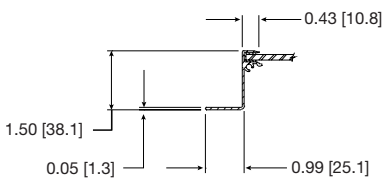
Section X-X

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances ±1/8" (3mm)



SX-55D, -60D, -65D



Section Z-Z

SOLAREX

SX-75, SX-80 and SX-85

Photovoltaic Modules

SX-75, SX-80 and SX-85 photovoltaic modules are the largest of Solarex's new SX™ module series, providing cost-effective photovoltaic power for general use. They operate DC loads directly or, in an inverter-equipped system, AC loads. They are suitable for single or multiple-module systems and, with 36 polycrystalline cells in series, charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.

Universal frame.

Applications of these modules, which generate peak power of 75 watts, 80 watts and 85 watts respectively, encompass virtually all applications where photovoltaics are a feasible energy source, including telecommunication systems, pumping and irrigation, cathodic protection, remote villages and homes, and land-based navigation aids. They are engineered under Solarex's IntegraSystem™ system integration concept, which ensures compatibility with other Solarex subsystems and components (support hardware, regulators, etc.) and easy system assembly. Their rugged Universal frame is suitable for industrial use, and exceeds the requirements of all certifying agencies.

Dual Voltage Capability

These modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. Shipped in 12V nominal configuration, with cell strings series-wired, the modules may easily be switched to 6V nominal output in the field by moving leads in the junction box.

High-Capacity Versatile Junction Box

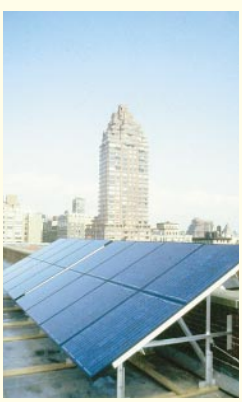
The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts ½" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm^2); standard terminals accept up to AWG #10 (6mm^2);
- a Solarstate™ charge regulator.

SX-80

The Natural Source for Electricity™

Solarex's polycrystalline silicon modules require much less energy to manufacture than comparable monocrystalline products, giving a significantly faster energy payback and larger lifetime contribution of green energy.



630 Solarex Court
Frederick
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www.solarex.com
Phone: (301) 698-4200
Fax: (301) 698-4201

Specifiications subject to change without notice

6049-1 4/99

Performance and Workmanship Warranted

The materials, workmanship and performance of the SX-75, -80 and -85 are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating), certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC, and approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.

TÜV Rheinland

UL

FM APPROVED

Quality Certified

SX-75, -80, and -85 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between –40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics[1]

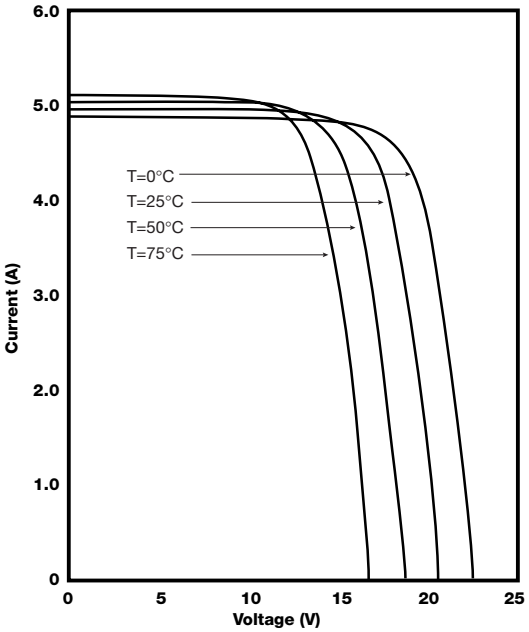
	SX-75	SX-80	SX-85
Maximum power (P_{max})	75W	80W	85W
Voltage at P_{max} (V_{mp})	16.5V	16.8V	17.1V
Current at P_{max} (I_{mp})	4.54A	4.75A	4.97A
Guaranteed minimum P_{max}	70W	75W	80W
Short-circuit current (I_{sc})	4.97A	5.17A	5.30A
Open-circuit voltage (V_{oc})	20.7V	21.0V	21.3V
Maximum system voltage[2]	600V		
Temperature coefficient of I_{sc}	(0.065±0.015)%/°C		
Temperature coefficient of V_{oc}	–(80±10)mV/°C		
Temperature coefficient of power	–(0.5±0.05)%/°C		
NOCT[3]	47±2°C		

Notes

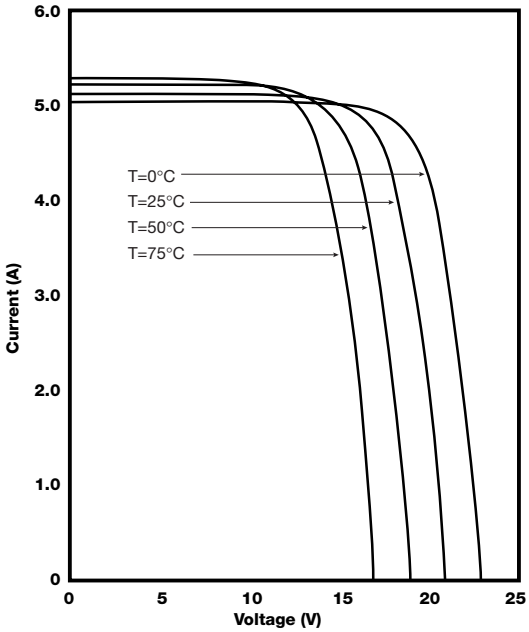
1. These specifiications represent the performance of typical 12 modules as measured at their output terminals, and do not include the effect of such additional equipment as diodes or cables. The specifiications are based on measurements made in accordanc with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:
   - illumination of 1 kW/m² (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
   - cell temperature of 25°C.

   For characteristics of modules in 6V confiiguration, divide the 12 voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.
2. U.S. NEC rating.
3. When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C, solar irradiation of 0.8 kW/m², and wind speed of 1 m/s.
4. These specifiications do not include the effect of light-induce degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

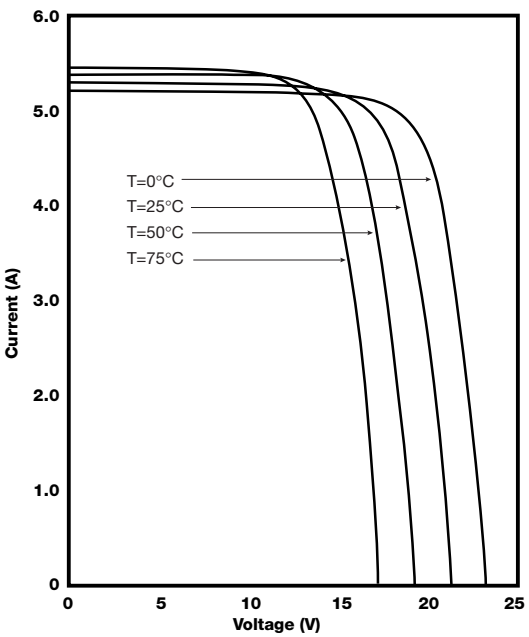
SX-75 I-V Curves



SX-80 I-V Curves



SX-85 I-V Curves

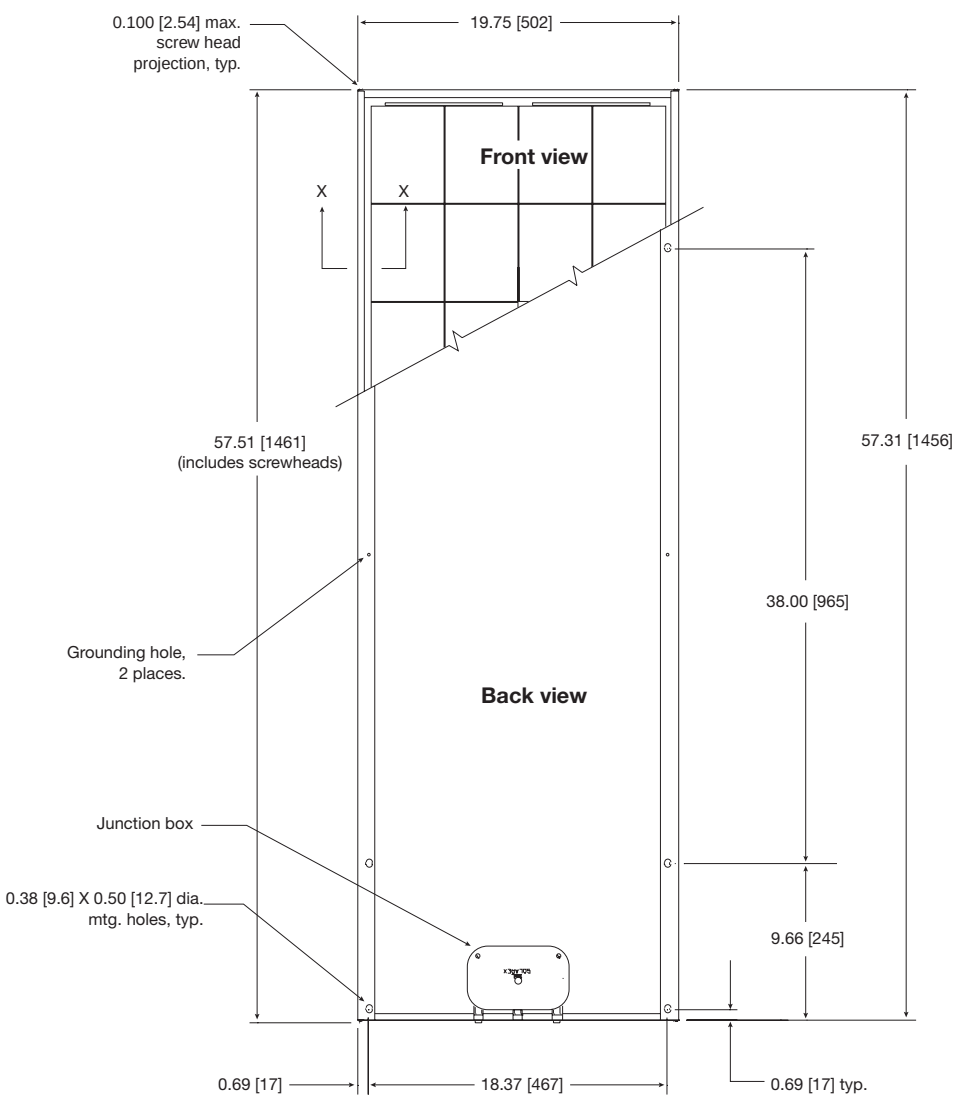


Mechanical Characteristics

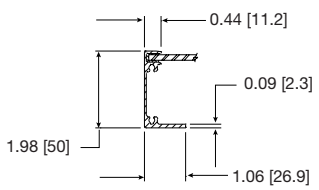
Weight
20.9 pounds (9.5 kg)

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances ±1/8" (3mm)



SX-75, -80, -85



Section X-X

MSX-110 and MSX-120 Photovoltaic Modules

SOLAREX

The MSX-110 and -120 are large industrial-grade photovoltaic modules, proven to deliver power reliably in virtually any climate. They are designed for large-scale applications which can exploit their high output, precise testing and labeling, and attractive appearance. Typical applications include utility grid-supplemental systems, telecommunications systems, pumping and irrigation, and remote villages and clinics. They are compatible with a range of Solarex subsystems and components.

Individually Tested, Labeled and Warranted

As part of Solarex's final inspection procedure, each of these modules is tested in a solar simulator and labeled with its actual output—voltage, current, and power at maximum power point (P_{max})—at Standard Test Conditions and Standard Operating Conditions. Furthermore, each MSX-110 and -120 module is covered by a Limited Warranty which warrants freedom from defects in materials and workmanship for 5 years; and by Limited Warranties of power output, which warrant:

- at least 90% of the specified minimum P_{max} for twelve years;
- at least 80% of the specified minimum P_{max} for twenty-five years.

Contact Solarex's Marketing Department or your Solarex representative for full terms of these warranties.

Versatile in Application

The MSX-110/120 design provides great versatility:

Dual Voltage Capability

These modules consist of 72 polycrystalline silicon solar cells electrically configured as four series strings of 18 cells each. They may be ordered in either 12V or 24V configuration, and may easily be switched between configurations in the field by moving leads in the junction boxes. This design also allows installation of bypass diodes on 18-cell strings, which can improve reliability and performance in systems with nominal voltage 24V and above.

Large Versatile Junction Box

These modules includes dual raintight (IP54-rated) junction boxes which accept conduit or cable via 1/2" nominal or PG13.5 metric fittings. They have sufficient space (25 cubic inches/ 411 cc each) not only to connect the module into a system, but to enclose array series/parallel connections and diodes. The standard six-terminal connection block accepts wire as large as AWG #10 (6mm^2); an optional terminal block accepts wire up to AWG #4 (25mm^2). Both blocks accept bare wire or preformed terminations.

Attractive, Proven Rugged

MSX modules are both attractive and rugged, having proved their reliability over decades of use at thousands of installations in every climate on Earth.

- Polycrystalline silicon solar cells are efficient and attractive, with cut crystal facets providing visual texture. For consistent appearance, they are set in a blue backsheet which closely matches cell color.
- The architectural-grade bronze-anodized extruded aluminum frame is corrosion-resistant, strong, compatible with Solarex mounting hardware and most other mounting structures.
- Cell strings are laminated between sheets of modified ethylene vinyl acetate (EVA) and tempered glass with a durable Tedlar backsheet for long-term weather-resistance.
- Tempered glass superstrate filters UV and is highly light-transmissive and impact-resistant.

Lower Balance of System Costs

With these modules' higher power, fewer modules are needed to serve an application, and many balance-of-system (BOS) costs are reduced accordingly. These include support structures, wiring, and labor-related costs such as assembly, installation, shipping and handling.

Safety Approved

MSX-110 and -120 modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating), certified by TÜV Rheinland as Class II equipment, and approved by Factory Mutual Research for application in NEC Class 1, Division 2, Group C & D hazardous locations.

FM APPROVED

UL

TÜV Rheinland

Quality certified

MSX-110 and -120 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the tests and requirements of IEC 61215, (formerly CEC 503) and IEEE 1262, including:

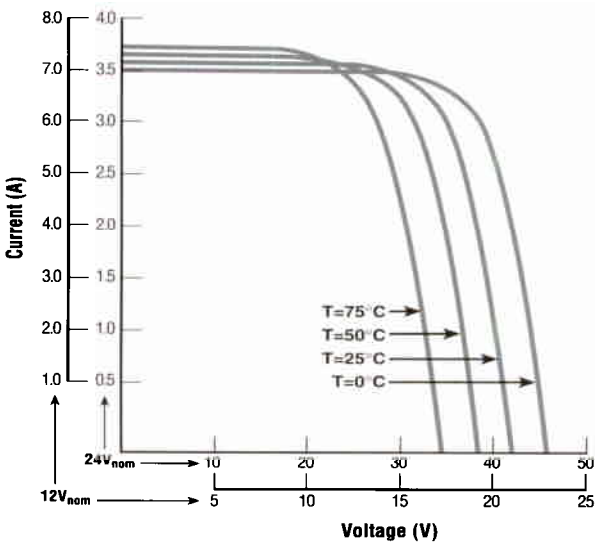
- repetitive cycling between -40°C and 90°C;
- repetitive cycling between -40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25 mm) hail at terminal velocity;
- 2700 VDC frame/cell string isolation test;
- performance at low light levels;

- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- resistance to UV degradation;
- robustness of electrical terminations;
- static loading, front and back, of 50 psf (2400 pascals); front loading (e.g. snow) of 113 psf (5400 pascals).

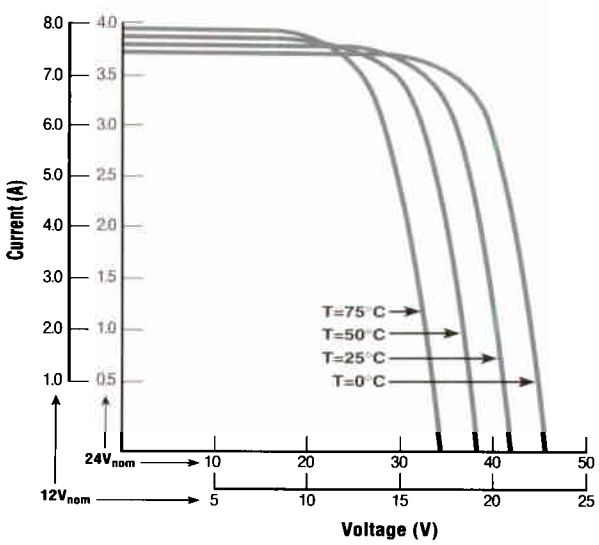
Options

- Blocking and bypass diodes
- Frameless laminate
- Integral Solarstate regulator

MSX-110 I-V Characteristics



MSX-120 I-V Characteristics



For more information, contact:

Typical Electrical Characteristics[1]

	MSX-110	MSX-120
Typical maximum power (P_{max})	110W	120W
Voltage @ Pmax (V_{mp})	32.9V	33.7V
Current @ Pmax (I_{mp})	3.34A	3.56A
Specified minimum P_{max}	105W	114W
Short-circuit current (I_{sc})	3.69A	3.87A
Open-circuit voltage (V_{oc})	41.2V	42.1V
Temperature coefficient of I_{sc}	(0.055±0.015)%/°C	
Temperature coefficient of V_{oc}	– (160±20)mV/°C	
Temperature coefficient of power	– (0.5±0.05)%/°C	
NOCT[2]	47±2°C	

Notes:

(1) These data represent the performance of typical modules, wired in 24V configuration, as measured at their output terminals, and do not include the effect of such additional equipment as diodes and cabling. The data are based on measurements made at Standard Test Conditions (STC), which are:
- Illumination of 1 kW/m² (1 sun) at spectral distribution of AM 1.5
- Cell temperature of 25°C or as otherwise specified (on curves).

Electrical characteristics of modules wired in 12V configuration may be found on the 12V I-V curve scales, or by doubling 24V current data and halving 24V voltage data.

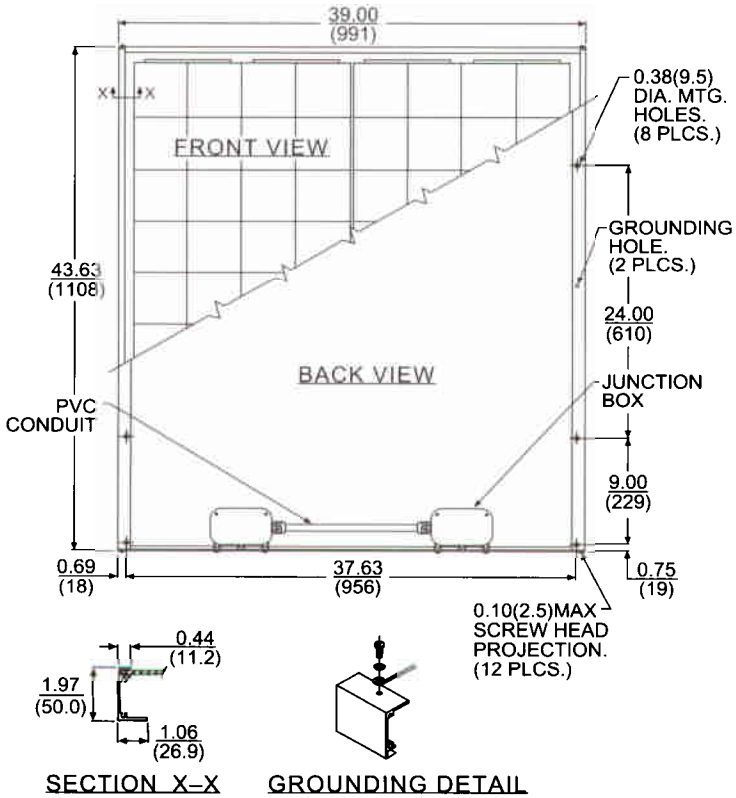
(2) Under most operating conditions, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indication of this temperature rise, and is the cell temperature under Standard Operating Conditions (SOC), which are:
- 20° ambient temperature
- solar irradiation of 0.8 kW/m²
- average windspeed of 1 m/s with the wind oriented parallel to the plane of the array, and all sides of the array fully exposed to the wind.

(3) During the stabilization process which occurs during the first few months of deployment, module power may decrease approximately 3% from typical P_{max}.

Mechanical Characteristics

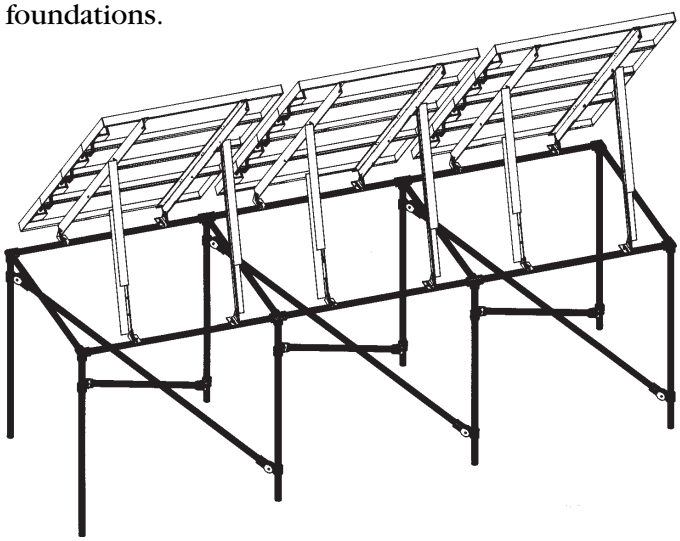
Weight 28.6 pounds (13.0 kg)

Dimensions Dimensions in brackets are in millimeters
Unbracketed dimensions are in inches
Overall tolerances ± 1/8" (3mm)



Solarex IntegraSystem™ Photovoltaic Array Support Systems

This publication describes Solarex's IntegraSystem photovoltaic array support hardware. This hardware is offered in a range of types, capable of mounting arrays as small as one module and as large as several dozen kilowatts to buildings, poles, and ground-based foundations.



IntegraSystem hardware is adaptable, reliable, easy to use, and uses a standardized complement of well-tested components. Its modular design allows it to precisely match your array support requirements and the characteristics of your site. It meets stringent specifications in any of its approved configurations.

Complete Integrated Kits

IntegraSystem hardware kits are complete and fully compatible with Solarex modules, panels and wiring kits. The interfaces between each kit and other array components are clearly identified in this brochure.

A Pre-engineered Support System

IntegraSystem kits are fully documented, easy to assemble, and compatible with other indicated Solarex products. Assembled arrays will withstand winds in excess of 125 mph (200 km/hr).

Engineered for Severe Environments

All kit materials are selected for corrosion resistance in severe climates. The largest mounting kit, the HPF1 rack structure, uses galvanized steel structural members. The structural members of smaller kits are fabricated from corrosion-resistant aluminum alloys and assembled with stainless steel fasteners.

Tested in the Real World

Twenty years of real-world testing and design development means IntegraSystem array hardware performs well anywhere. Solarex' rigorous material specifications ensure consistent quality.

Adjustable for Any Latitude

Integrasystem kits allow arrays to be adjusted to and securely fixed at the optimum tilt angle for sites at any latitude. The tilt angle range (in degrees of variance from horizontal) is shown in the kit specifications which follow.

The IntegraSystem Concept

The key to the IntegraSystem™ concept is pre-engineering. Every IntegraSystem PV component or subsystem is electrically and mechanically pre-engineered for reliability, compatibility with other IntegraSystem components, ease of installation and compliance with code and safety requirements. This pre-engineering process includes:

- *identifying the subsystem's interfaces with other components and ensuring compatibility;*
- *applying design and selection criteria that assure compliance with NEC requirements and efficient, safe, reliable system operation;*
- *applying economies of scale to the process of system design and component selection and procurement.*

IntegraSystem enables a customer to select PV components with confidence that they will assemble easily into an efficient, reliable, cost-effective power system.

630 Solarex Court, Frederick, Maryland 21703 USA • PHONE (301) 698-4200• FAX (301) 698-4201

GENERAL SPECIFICATIONS

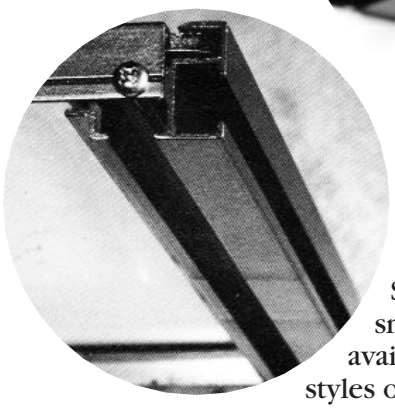
Wind loading	Minimum 125 mph (200 km/hr)
Materials	Hot-dip galvanized Schedule 40 steel pipe
	5052 or 6061 (as appropriate) clear anodized structural aluminum alloy
	Type 316 stainless steel fasteners

SINGLE-MODULE MOUNTING HARDWARE

IntegraSystem kits are available for mounting single modules to cylindrical or square poles or masts and horizontal, vertical or sloping structural surfaces. These kits include all necessary hardware and fasteners with the exception of the fasteners that attach the completed assembly to the mounting surface; fasteners required for this function vary greatly since mounting surfaces vary greatly. The kits include complete installation instructions and recommendations for attachment hardware (e.g., hose clamps, U-bolts, lag screws, etc.) for use on common surfaces.

Universal

Multimount



Some of Solarex's small PV modules are available with two styles of frame: the "Universal" frame and the Multimount™ frame. Mounting kits for each frame style are available.

Mounting Kits for Small Module with Universal Frame

These kits consist of a mounting bracket, a module bracket and required assembly fasteners. They mount one MSX-10, -18, -30 or -40 with universal frame to a vertical pole (cylindrical or square) or a flat structural surface.

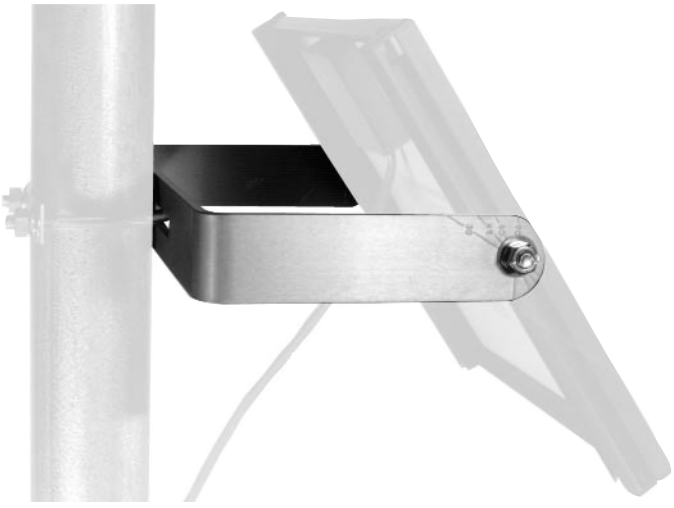
- Continuous adjustment of module tilt angle from 0° to 90°.
- Heavy-duty aluminum alloy brackets with clear anodized finish.
- Fits poles with outside diameter 2-7/8" to 12" using hose clamps, 1" to 4" using U-bolts.

Module	Mounting Kit
MSX-18, -30, and -40	HPM18-30
MSX-10	HPM10U

Mounting Kit for Small Module with Multimount Frame

These kits mount one MSX-5, -10, -18, or -30 with Multimount™ frame to a vertical pole (cylindrical or square) or a flat structural surface.

- Continuous adjustment of module to any desired tilt; tilt angles are imprinted on the bracket.
- Fits poles with outside diameter 1" to 4"

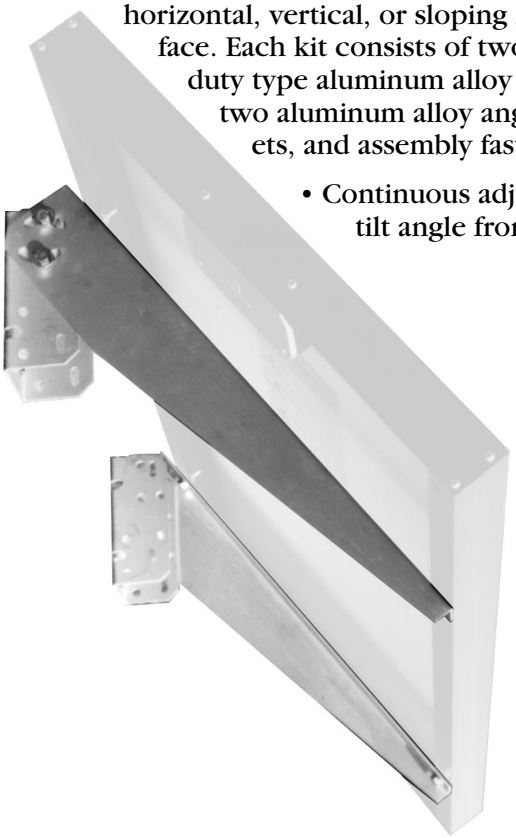


Module	Mounting Kit
MSX-18 and 30	HPM18-30M
MSX-5 and 10	HPM5-10

Large Module Flat-surface Mounting Kits

These kits attach a single large module to a horizontal, vertical, or sloping flat surface. Each kit consists of two heavy-duty type aluminum alloy brackets, two aluminum alloy angle brackets, and assembly fasteners.

- Continuous adjustment of tilt angle from 0º to 90º



Module	Mounting Kit
MSX-50, -53, -56, -60, and -64	HFMH60
MSX-77, -83	HFMH80

Mounting Kits for Large Module with Long Axis Horizontal

These kits consist of a crossarm bracket, two feet, two angle brackets, and required fasteners. They mount a single large Solarex module to a vertical pole or other flat vertical, horizontal or sloping surface, supporting the module with its long axis horizontal.

- Continuous adjustment of tilt angle from 0º to 90º
- Fits poles with outside diameter 2" to 12-3/4"

Module	Mounting Kit
MSX-50, -53, -56, -60, and -64	HPMH53-60
MSX-77, -83	HPMH80

Mounting Kit for Large Module with Long Axis Vertical, Item HPMV53-60

This kit consists of six brackets, a two-section adjustable leg assembly, and assembly fasteners. It mounts a single large Solarex module to a vertical pole or other flat vertical surface, supporting the module with its long axis vertical.

- Applicability: Single MSX-50, -53, -56, -60 or -64 module
- Incremental adjustment of tilt angle from 15º to 70º.
- Fits poles with outside diameter 1" to 4"

Mounting Kit for Marine Modules

These kits consist of two brackets and assembly hardware, and mount an MSX-20MM or -38 MM to a vertical or horizontal beam or a flat structural surface.

- Continuous adjustment of tilt angle from 0º to 90º.
- Fits poles with outside diameter 1" to 2-1/2"

HPMV KIts

HPMH KIts

Module	Mounting Kit	
	Vertical Beam	Horizontal Beam
MSX-20MM	HPMV20MM	HPMH20MM
MSX-38MM	HPMV38MM	HPMH38MM

MOUNTING HARDWARE FOR MULTIPLE-MODULE ARRAYS

The IntegraSystem modular approach to mounting a multiple-module array considers the support system as three subassemblies, which are described in the remainder of this brochure. When ordering IntegraSystem hardware for a site, ensure that *all three hardware categories* are considered in your design.

Panel assembly kits which combine modules into panels ranging in size from 1 module (a 1X panel) to 6 modules (a 6X panel).

Leg kits which hold panels at the appropriate tilt angle

Site structural interface. This must accept the mounting feet of the leg kits and be able to withstand mechanical loading transferred by the array. It may be provided by Solarex or the Customer. Typical Customer-furnished interfaces include poured concrete pads, roof-mounted external beams, and horizontal or vertical poles.

Panel Assembly Kits, Items HPK

IntegraSystem panel assembly kits assemble multiple modules into panels, using longitudinal beams which mechanically integrate the modules, add rigidity to the panel, and accept mounting feet and legs. Each panel assembly kit consists of two beams fabricated from angle stock and the fasteners necessary to attach modules to the beams.

Kits applicable to MSX-40, -50, -53, -56, -60

HPK KIts

and -64 modules are identified by item numbers ranging from HPK2X (for a 2-module panel) through HPK6X (for a 6-module panel). The item numbers of most kits for MSX-77, -83, and -120 modules include a module designator suffix, as shown in Table 1.

Table 1
HPK Panel Assembly Kits for MSX-77, -83 and -120 Modules

Panel Configuration	HPK Item Number
2 MSX-77 or -83 modules	HPK2X-80
4 MSX-77 or -83 modules	HPK4X-80
1 MSX-120 module	HPK1X-120
2 MSX-120 modules	HPK4X
3 MSX-120 modules	HPK3X-120

Adjustable Leg kits, Items HAFMS

Each leg kit consists of two adjustable two-section legs (adjustable in 4-inch increments), four "feet", and required assembly hardware. The kits securely support a panel at the desired tilt angle on horizontal, vertical and sloping surfaces. Table 2 provides guidance in selecting the correct leg kit for supporting a panel on a Customer-supplied horizontal foundation or mounting surface. Table 3 (over) provides guidance in selecting the correct leg kit for supporting a panel on a vertical mounting surface.

HAFMS KIts

Note that these kits do not include hardware for attaching the feet to the supporting surface.

Table 2
Selecting HAFMS Leg Kits for Mounting Panels on Horizontal Surfaces

Panel Configuration	Leg Kit	Tilt Range
2 or 3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module	HAFMS12 HAFMS20 HAFMS28	12° to 30° 24° to 63° 35° to 88°
4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules	HAFMS12 HAFMS20 HAFMS28 HAFMS36	10° to 22° 19° to 42° 28° to 68° 36° to 89°
5 or 6 MSX-40, -50, -60 (series) modules 4 MSX-77 or -83 modules 3 MSX-120 modules	HAFMS12 HAFMS20 HAFMS28 HAFMS36 HAFMS36 plus 36" extension	7° to 14° 8° to 26° 10° to 38° 19° to 50° 43° to 77°

Panel pole mounting kit, Item HPMA

A panel pole mounting kit consists of two crossarm brackets which, in conjunction with the appropriate leg kit and panel kits, support a panel on a vertical pole or flat vertical surface. This kit does not include hardware for attaching the brackets to the supporting surface, since surfaces and appropriate fasteners vary widely.

- Supports panels of two, three or four MSX-50, -53, -56, -60 or -64 modules; two MSX-77 or -83 modules; or one MSX-120 module.
- Incremental adjustment of tilt angle is provided by the separately ordered HAFMS leg kit. Table 3 provides guidance in selecting the leg kit needed for various angles.
- Fits poles with outside diameter 2" to 12-3/4"

Array Support Rack Structure, Items HPF1

The IntegraSystem rack structure is a modular galvanized steel rack which provides a stable elevated base for a PV array. Used in conjunction with the appropriate HAFMS leg kit, it supports panels at any desired tilt angle. The starting point for any rack structure is the HPF101, a single-bay rack which supports one panel consisting of one or more modules. The rack is expanded by adding HPF1E1 extension bays, each of which support an additional panel.

Solarex recommends that each rack structure not be extended beyond a total of ten bays. If the array is larger than ten bays, it should be divided into two subarrays.

- Includes precut Schedule 40 galvanized steel pipe and all required fittings.
- Fittings assemble to pipe with socket-head Allen (hex) screws. Allen wrench is included.
- See Table 4 for guidance in selecting correct HAFMS leg kit.
- Optional HSK support kit available for mounting equipment on rack uprights

Table 3
Selecting HAFMS Leg Kits for Mounting Panels on Vertical Surfaces

Panel Configuration	Leg Kit	Tilt Range
2 or 3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module	HAFMS28 HAFMS20 HAFMS12	10° to 55° 25° to 65° 60° to 75°
4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules	HAFMS36 HAFMS28 HAFMS20 HAFMS12	10° to 55° 25° to 65° 50° to 75° 75° to 80°

Array Support Rack Structure

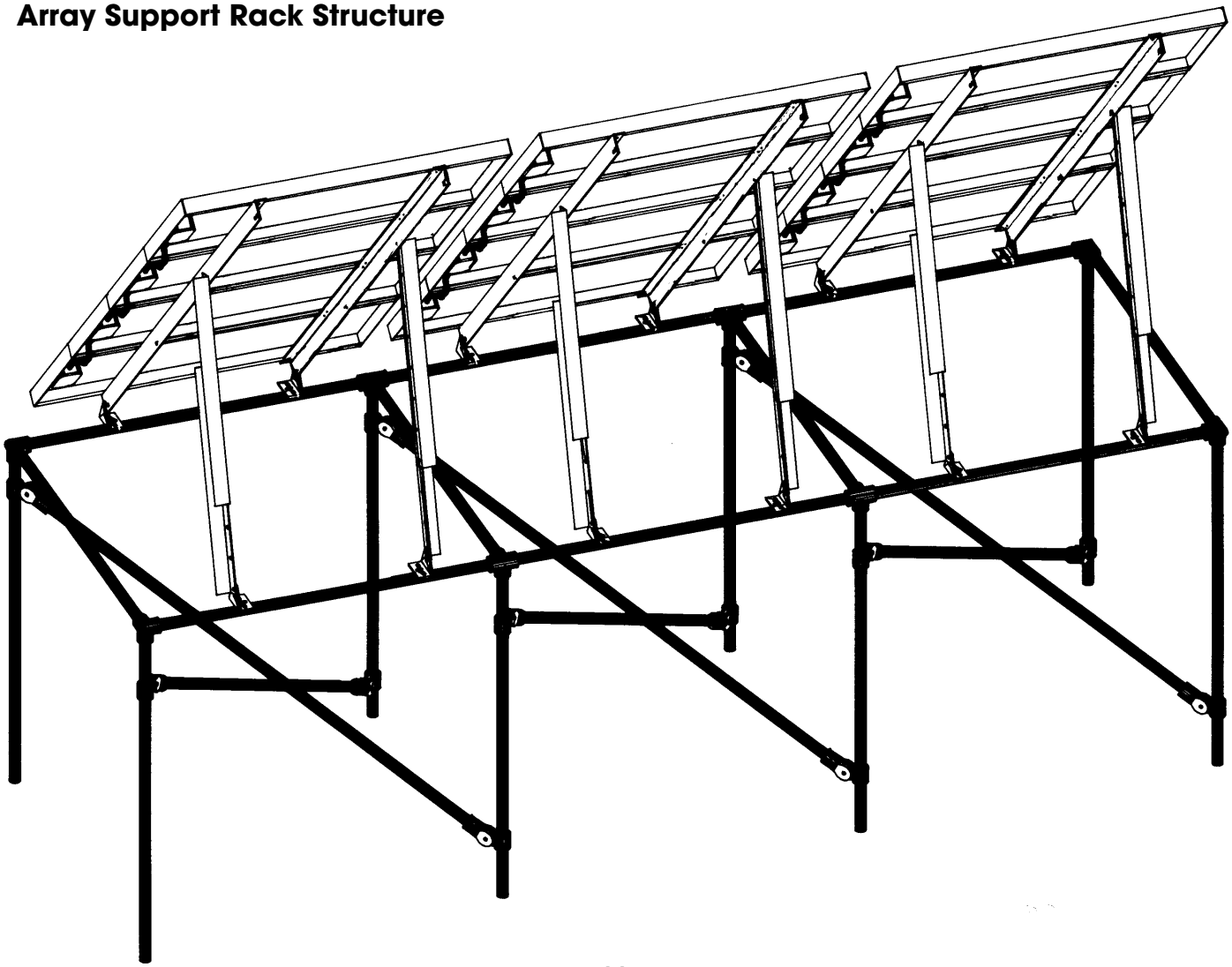
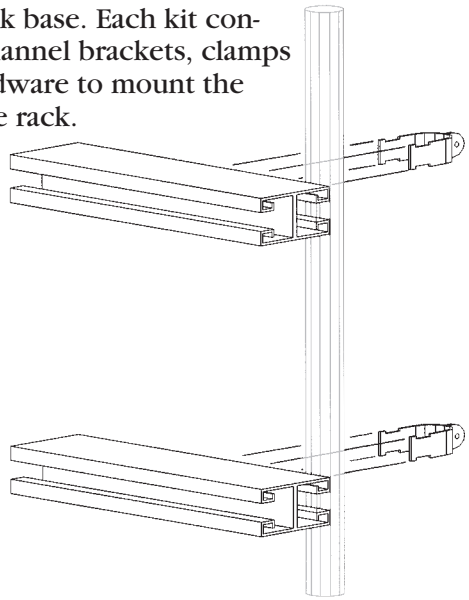


Table 4
Selecting HAFMS Leg Kits for Mounting Panels on Rack

Panel Configuration	Leg Kit	Tilt Range
3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module	HAFMS12 HAFMS20 HAFMS28	14° to 22° 22° to 38° 30° to 54°
4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules	HAFMS12 HAFMS20 HAFMS28 HAFMS36	15° to 23° 23° to 40° 32° to 57° 40° to 76°
5 or 6 MSX-40, -50, -60 (series) modules 4 MSX-77 or -83 modules 3 MSX-120 modules	HAFMS12 HAFMS20 HAFMS28 HAFMS36	13° to 21° 21° to 37° 29° to 54° 37° to 72°

HSK Enclosure Attachment Kits

HSK attachment kits are designed to support equipment (typically an enclosure containing switchgear or a controller) on a vertical member of the HPF rack base. Each kit consists of two channel brackets, clamps and other hardware to mount the brackets to the rack.



The HSK12 kit includes channel brackets 12" long; the HSK24 kit includes 24" channel brackets.

Selecting a Fixed Tilt Angle

The angle at which an array is tilted affects its ability to collect solar energy. Some arrays are continuously or periodically adjusted to account for the sun's daily or seasonal movement, but at remote sites it is usually more cost-effective for the array to be installed at a fixed angle. This angle varies with site latitude, load characteristics and other factors, and must be known to enable ordering some of the support hardware in this publication.

Accurate design of a PV power system is a complex process, requiring a computer simulation of the on-site interaction between the load and the power system. The optimum array tilt angle is one product of this process, which can be performed by Solarex representatives.

Table 5 provides approximate tilt angle recommendations, by site latitude, for typical installations. These recommendations are based on certain assumptions, most importantly that the electrical load on the system is the same every day of the year. This table is not intended to replace a comprehensive system design process.

Tilt angle is not critical: variations of up to 5° usually make little difference in an array's ability to support a given load.

If modules are not cleaned regularly, it is recommended that they not be mounted at an angle flatter than 15°. Flatter angles cannot take full advantage of the cleansing action of rainfall.

Table 5
Approximate Array Tilt for Loads with Consistent Daily Energy Requirements

Latitude of Site	Recommended Tilt Angle
0-4°	10°
5-20°	Add 5° to local latitude
21-45°	Add 10° to local latitude
46-65°	Add 15° to local latitude
66-75°	80°

For more information, contact:

Atlantic Solar Products, Inc.
9351-J Philadelphia Road, Baltimore, MD 21237 Phone: 410-686-2500

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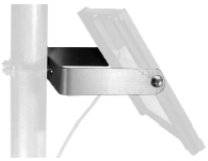
Side of Pole Mounts

Atlantic Solar Products, Inc., offers the following Side of Pole Mounts:

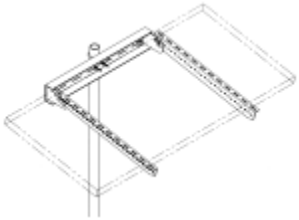


HPM 5-10U

HPM 5-10 Hinge/ HPM 18-30

HPMH 60

Model	Fits
HPM 5/10 U	SX-5-M, SX-10-M
HPM 5/10 Hinge	SX-5, SX-10 Both U and M Series
HPM 18/30	SX-20, 30,40 Both U and M Series
HPMH-60	SX-50,55,60,65



UniRac Model Number	Sch.40 Pole Size (in.)	BP Solar							Kyocera		Siemens				UniSolar
		270 275 585 590 SX75TU	SX55 SX60 SX65	SX75 SX80 SX85	SX110 SX120	MST 43	MSX 120	2150 3160 4160 5170 SX150	KC60 KC70 KC80	KC120	SM100 SM110	SP65 SP70 SP75	SP130 SP140 SP150	SR90 SR100	US64
U-11 and U-PS Series Side of Pole Racks															
U-11/20M	2.5	-	1	-	-	-	-	-	-	-	-	-	-	-	-
U-11/20XL	2.5	-	-	1	-	-	-	-	-	-	-	-	-	-	-
U-11/24M	2.5	1	-	-	-	-	-	-	-	-	-	1	-	1	-
U-11/24L	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-11/28M	2.5	-	-	-	-	-	-	-	1	-	1	-	-	-	-
U-11/28L	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/24M	2.5	-	-	-	-	-	-	-	-	-	-	-	-	1	-
U-PS/26M	2.5	-	-	-	-	1	-	-	-	-	1	-	-	-	-
U-PS/26XXL	2.5	-	-	-	-	-	-	-	-	1	-	-	-	-	-
U-PS/28L	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/30XL	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	1
U-PS/30XXL	2.5	-	-	-	1	-	-	-	-	-	-	-	-	-	-
U-PS/32M	2.5	-	-	-	-	-	-	-	-	-	-	-	1	-	-
U-PS/32XL	2.5	-	-	-	-	-	-	1	-	-	-	-	-	-	-
U-PS/40M	2.5	-	2	-	-	-	1	-	-	-	-	-	-	-	-
U-PS/40XL	2.5	-	-	2	-	-	-	-	-	-	-	-	-	-	-
U-PS/44M	2.5	2	-	-	-	-	-	-	-	-	-	2	-	-	-
U-PS/44L	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3														

U-PS/48M		-	-	-	-	-	-	-	-	-	-	-	-	2	-
U-PS/52M	3	-	-	-	-	-	-	-	2	-	2	-	-	-	-
U-PS/52L	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/52XL	3	-	-	-	-	-	-	-	-	2	-	-	-	-	-
U-PS/60M	3	-	3	-	-	2	-	-	-	-	-	-	-	-	-
U-PS/60L	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
U-PS/60XL	3	-	-	3	2	-	-	-	-	-	-	-	-	-	-
U-PS/64M	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
U-PS/64XL	3	-	-	-	-	-	-	2	-	-	-	-	-	-	-
U-PS/68L	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/72M	4	-	-	-	-	-	-	-	-	-	-	-	-	3	-
U-PS/80M	4	-	4	-	-	-	2	-	3	-	3	-	-	-	-
U-PS/80L	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/80XL	4	-	-	4	-	-	-	-	-	3	-	-	-	-	-
U-PS/84M	4	-	-	-	-	3	-	-	-	-	-	4	-	-	-
U-PS/88M	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-
U-PS/88L	4	-	-	-	-	-	-	-	-	-	-	-	-	-	3
U-PS/96L	4	-	-	-	-	-	-	-		-	-	-	-	-	-
U-PS/106M	4	-	-	-	-	-	-	-	4	-	-	-	-	-	-

MORNINGSTAR corporation

Morningstar's ***SunSaver*** is the world's leading small solar controller for both professional and consumer applications.

SunSaver's technology provides:

- Exceptional Reliability
- PWM Battery Charging
- Consistent High Quality

The SunSaver's advanced design delivers outstanding performance and value. The SunSaver's low cost is made possible by Morningstar's unique approach to design and manufacturing:

- Automated production
- ISO 9002 quality programs
- Latest power electronic technologies
- Latest control and logic technologies
- High volume manufacturing

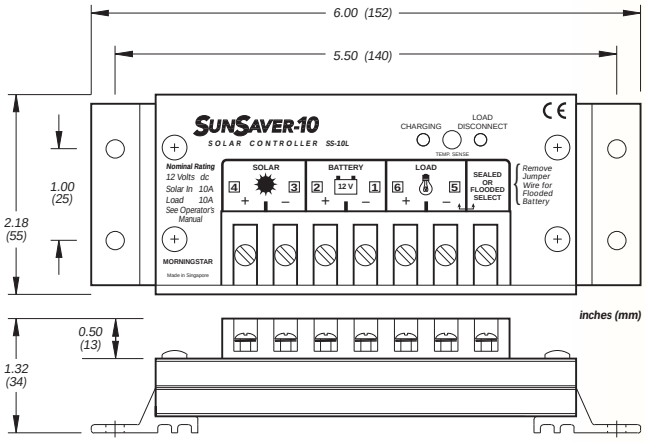
Features:

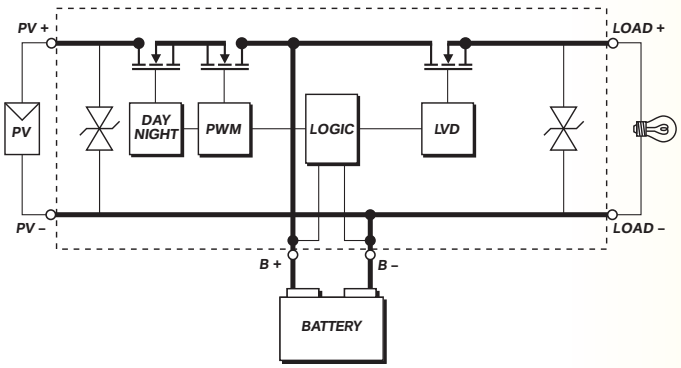
- Eight versions available (see back)
  - 12 and 24 volts
  - 6, 10 and 20 amps
- 100% solid state
- Series design (not shunt)
- True 0 to 100% PWM duty cycle
- Setpoint accuracy to 35 mV
- Rated for 25% overloads
- Fully encapsulated in epoxy potting
- Marine rated terminals / anodized case
- Temperature compensation
- Sealed / Flooded battery select
- No need to derate
- Parallel for 40 amps or more
- Green charging / Red LVD indicators

SUNSAVER™ TECHNICAL SPECIFICATIONS

SunSaver Model Selection Chart

MODEL NUMBER	SOLAR RATING (Amps) 0 10 20	LOAD RATING (Amps) 0 10 20	LVD	12V	24V
• SS-6	■	■		■	
• SS-6L	■	■	■	■	
• SS-10	■	■		■	
• SS-10L	■	■	■	■	
• SS-10-24V	■	■			■
• SS-10L-24V	■	■	■		■
• SS-20L	■	■	■	■	
• SS-20L-24V	■	■	■		■





Mechanical Specifications

Wire size #10 AWG (5.2 mm²)
Anodized aluminum case
Marine rated terminals
Epoxy encapsulated
Weight is 8 oz (0.23 kg)

Electrical Specifications

	12 Volt	24 Volt
Rated Solar Input	6.5/10/20 A	
Rated Load	6/10/20 A	
25% Current Overload	5 min.	5 min.
Regulation Voltage:		
Sealed Battery	14.1 V	28.2 V
Flooded Battery	14.4 V	28.8 V
Load Disconnect	11.5 V	23.0 V
LVD Reconnect	12.6 V	25.2 V
Temp. Comp. (mV/°C)	–28	–56
Self-consumption	6 to 10 mA	
Operating Temp.	–40 to +85ºC	

WARRANTY: ***Five year warranty period. Contact Morningstar or your authorized distributor for complete terms.***

AUTHORIZED MORNINGSTAR DISTRIBUTOR:

MORNINGSTAR corporation

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E-mail: info@morningstarcorp.com
Website: www.morningstarcorp.com

CE

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8A27

SPECIFICATIONS

Nominal Voltage (V)	12V
Capacity at C/100	106Ah
Weight	63 (28.6 kg)
Plate Alloy	Lead Calcium
Posts	Forged terminals & bushings
Container/Cover	Polypropylene
Operating Temperature Range	-40°F (-40°C) – 140°F (60°C)
Charge Voltage @ 68°F (20°C)	
Cycle	2.40 - 2.43 VPC
Float	2.25 - 2.30 VPC
Vent	Self-sealing (2 PSI operation)
Resistance	3.0 Milliohms (full charge)
Terminal	T876

Rated non-spillable by ICAO, IATA and DOT

Made in the U.S.A by East Penn Manufacturing

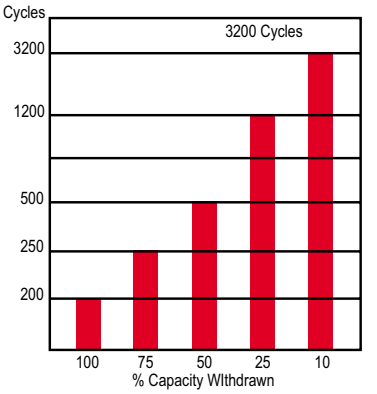
Distributed by:

Valve-Regulated, Absorbed Glass Mat Technology

DIMENSIONS

Length (mm)	**12.75 (324 mm)**
Width (mm)	**6.75 (171 mm)**
Height (mm)	**9.38 (238 mm)**

Cycling Ability



Number of cycles vs. depth of discharge at +20°C
discharge with 20 hour rate

MK Battery
1645 South Sinclair Street • Anaheim, California 92806
Toll Free: 800-372-9253 • Fax: 714-937-0818 • E-Mail: sales@mkbattery.com

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

NOTES: UNLESS OTHERWISE SPECIFIED

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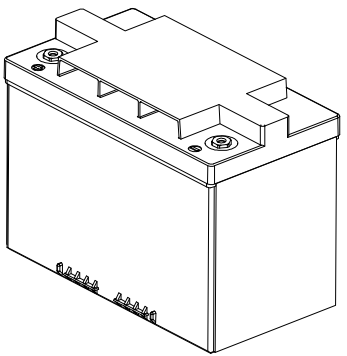
3. ALL DIMENSIONS ARE IN INCHES [MM].
4. ABBREVIATION USED IN TITLE IS: SEALED LEAD ACID (SLA).



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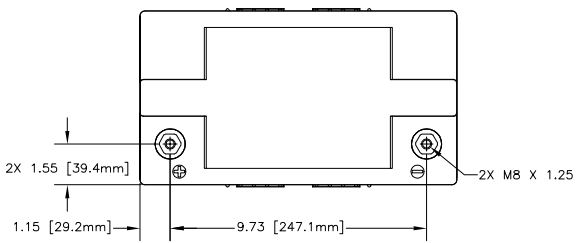

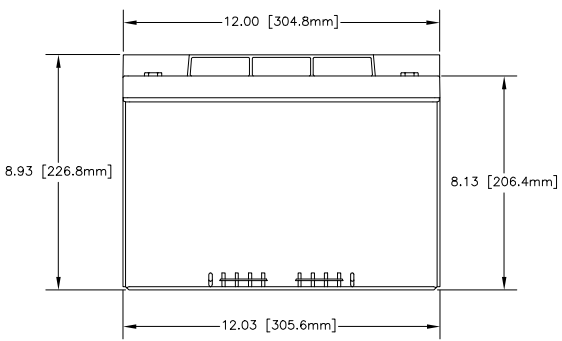

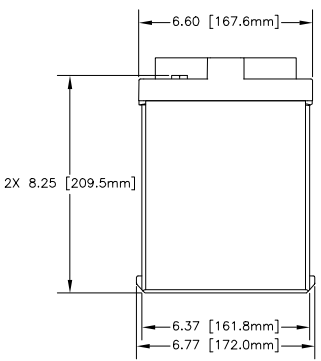

CAPACITY RATINGS	
PART NUMBER	PVX-1040T
NOMINAL WEIGHT	66 LBS [30 KG]
AMPERE HOUR CAPACITY @ 24 HOUR 1.75 VOLTS/CELL @ 77°F (25°C)	104 AH

ENVELOPE DRAWING

QTY REQD	CAGE CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO.
PARTS LIST					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± 1/32 | DECIMALS .XX ± .06, .XXX ± .030 | ANGLES ± 1°

TREATMENT: NONE
FINISH: NONE
SIMILAR TO: NA | ACT WT: NA | CALC WT: NA

CONTRACT NO.: NA

APPROVALS		DATE
DRAWN	ELH	8/13/01
CHECKED	HRF	8/21/01
APPROVED	JBT	8/23/01
ISSUED	AT	8/24/01

CONCORDE BATTERY CORPORATION
2009 SAN BERNARDINO RD. W. COVINA, CA 91790

TITLE: BATTERY, SLA, 12 VOLT, PVX-1040T

SIZE: C | CAGE CODE: 63017 | DWG NO.: PVX-1040T | REV:

SCALE: NONE | SHEET 1 OF 1

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

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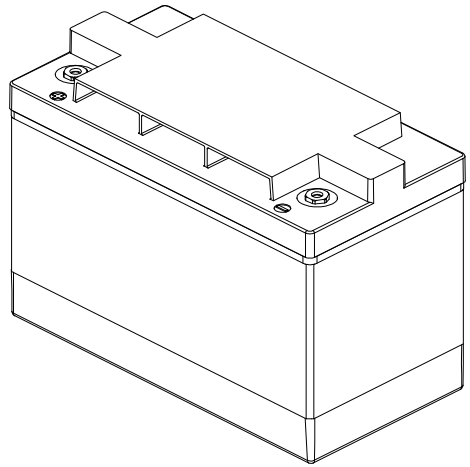
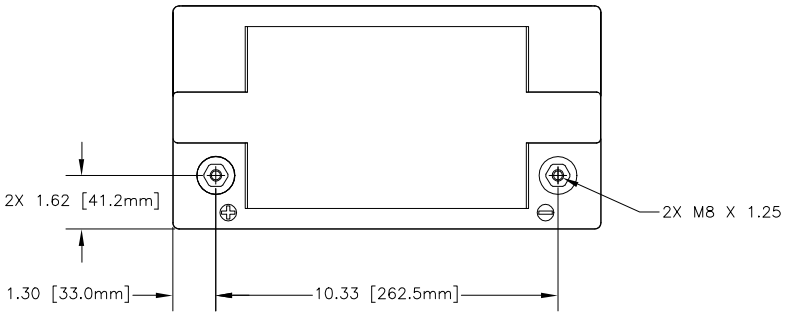
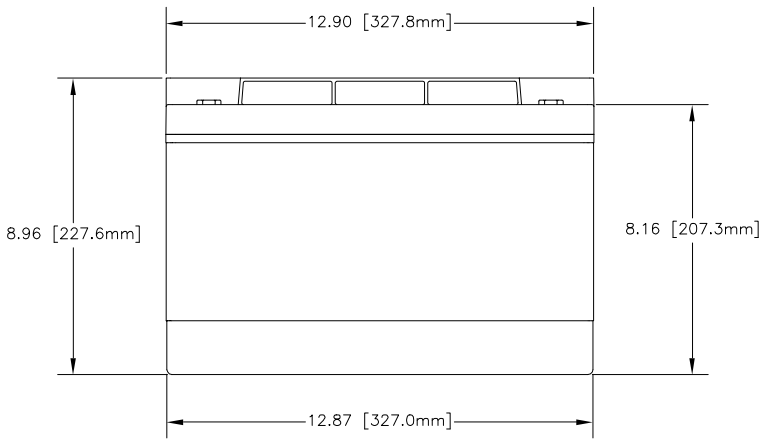
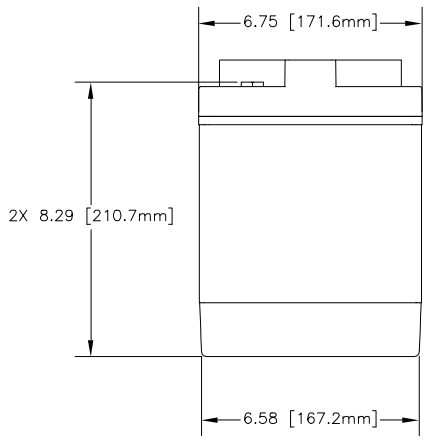
4. ABBREVIATION USED IN TITLE IS: SEALED LEAD ACID (SLA).



REFERENCE VIEW







CAPACITY RATINGS		
PART NUMBER	PVX–890T	PVX–1080T
NOMINAL WEIGHT	62 LBS [28.2 KG]	70 LBS [31.8 KG]
AMPERE HOUR CAPACITY @ 24 HOUR 1.75 VOLTS/CELL @ 77°F (25°C)	89 AH	108 AH

ENVELOPE DRAWING

QTY REQD	CAGE CODE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± 1/32 DECIMALS .XX ± .06 .XXX ± .030 ANGLES ± 1°

TREATMENT NONE
FINISH NONE
SIMILAR TO NA | ACT WT NA | CALC WT NA

CONTRACT NO. NA

APPROVALS		DATE
DRAWN	ELH	8/13/01
CHECKED	HRF	8/21/01
APPROVED	JBT	8/23/01
ISSUED	AT	8/24/01

CONCORDE BATTERY CORPORATION
2009 SAN BERNARDINO RD, W. COVINA, CA 91790

TITLE BATTERY, SLA, 12 VOLT, PVX–1080T SERIES

SIZE C | CAGE CODE 63017 | DWG NO. PVX–1080T | REV

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Atlantic Solar

Concorde Battery

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SUN XTENDER® SERIES ...the heart of your solar system

MAINTENANCE-FREE, VALVE-REGULATED, SEALED LEAD-ACID BATTERIES DESIGNED FOR DEEP CYCLE / BACK-UP POWER PHOTOVOLTAIC APPLICATIONS

SPECIFICATIONS

Click Here For Battery Service Instructions

Part Number	Volts	Overall Dimensions L in (mm)	W in (mm)	H in (mm)	Unit Wt lbs (kg)	Nominal Capacity Ampere Hours @ 8 Hr Rate	24 Hr Rate	48 Hr Rate	120 H Rate
PVX-340T	12	7.71 (196)	5.18 (132)	6.89 (175)	25 (11.4)	30	34	36	38
PVX-420T	12	7.71 (196)	5.18 (132)	8.05 (204)	30 (13.6)	36	42	43	45
PVX-490T	12	8.99 (228)	5.45 (138)	8.82 (224)	36 (16.4)	43	49	52	55
PVX-560T	12	8.99 (228)	5.45 (138)	8.82 (224)	40 (18.2)	49	56	60	63
PVX-690T	12	10.22 (260)	6.60 (168)	8.93 (227)	51 (23.2)	60	69	73	79
PVX-840T	12	10.22 (260)	6.60 (168)	8.93 (227)	57 (25.9)	74	84	90	97
PVX-1080T	12	12.90 (328)	6.75 (172)	8.96 (228)	70 (31.8)	97	108	118	126
PVX-1040T	12	12.03 (306)	6.77 (172)	8.93 (227)	66 (30.0)	93	104	112	120
PVX-890T	12	12.90 (328)	6.75 (172)	8.96 (228)	62 (28.2)	79	89	95	102
PVX-2120L	12	20.75 (528)	8.71 (222)	10.42 (265)	138 (62.7)	194	212	235	253
PVX-2580L	12	20.76 (527)	10.89 (277)	9.65 (245)	165 (75)	236	258	285	305
PVX-1040HT	12	12.03 (306)	6.77 (172)	8.93 (227)	66 (30.0)	93	104	112	120
PVX-1380T	6	10.22 (260)	6.77 (172)	8.92 (227)	51 (23.2)	120	138	146	158
PVX-1680T	6	10.22 (260)	6.77 (172)	8.92 (227)	57 (25.9)	148	168	180	194
PVX-1780T	6	12.90 (328)	6.75 (171)	8.96 (228)	62 (28.2)	158	178	190	204
PVX-2080T	6	12.03 (306)	6.77 (172)	8.93 (227)	66 (30.0)	186	208	224	240
PVX-2160T	6	12.90 (328)	6.75 (171)	8.96 (228)	70 (31.8)	194	216	236	252
PVX-2240T	6	10.27 (261)	7.12 (181)	10.24 (260)	67 (30.4)	204	224	246	263

Standard Terminals: All "T" batteries now incorporate copper alloy M8 terminals except the PVX-340T & PVX-420T which are M6. All batteries supplied with silicon bronze bolts, nuts, and washers as required for installation. No exposed lead terminals. This change was made to improve environmental safety and health. **Optional Terminals:** L Blade or Automotive post type terminals are available installed by adding the appropriate suffix: "L"

for L Blade or "A" for automotive post. **Handles:** All part numbers include lifting handles except the PVX-490T, PVX-560T, and PVX-2240L. **Ratings:** Capacity ratings are stated at 77F (25 C) to 1.75 volts per cell. **Drawings:** Click on the part number in the table above or contact the factory.

SUN-EXTENDER® BATTERY DESIGN FEATURES

- Copper Alloy Terminals for improved electrical connections.
- No exposed lead terminals. This change was incorporated to improve environmental safety and health.
- Threaded insert terminals are recessed to prevent short circuits across battery connections.[1]
- New cover is flat top design. No protruding or exposed vent valves.[1]
- Built in lifting handles, except PVX-490T, PVX-560T, and PVX-2240L.
- Reinforced container walls to reduce bulging.
- High Impact Strength Copolymer Polypropylene Case and Cover.
- Completely Sealed Valve Regulated Construction.
- Immobilized Electrolyte Non-Spillable.
- Maintenance Free Design Never Requires Watering.
- Absorbed Glass Mat (AGM) Micro-porous Glass Separators retain electrolyte.
- Flame Arresting Pressure Regulated Safety Valves.
- UL Recognized Systems Component.
- Positive Plates - Proprietary Lead Calcium Alloy- Negatives Plates - Lead Calcium.
- Low Self Discharge Rate Approximately 1 % per month at 25 C (77 F).
- Operate over a Wide Range of Temperatures from -40 C (-40 F) to +72 C (+160 F).
- Classified as "Non-Spillable Battery" for Transport.
- Most Part Numbers comply with DOT HMR49, Non-Hazardous Materials.

[1] Threaded Insert "T" type Features.

CHARGING INSTRUCTIONS

Initial charge or recharge: 2.37 to 2.40 volts per cell at 25 C (77 F). **Float charge:** 2.23 volts per cell at 25 C (77 F). **Equalize charge:** 2.40 volts per cell at 25 C (77 F). Temperature compensation = ±3.75 mV. per cell per degree C [Reference to 25 C (77 F)]. This is for battery temperature (not ambient temperature) and is useful for battery temperatures from O C (32 F) to 40 C (104 F). Contact Concorde Battery Corporation for temperatures that exceed this range.

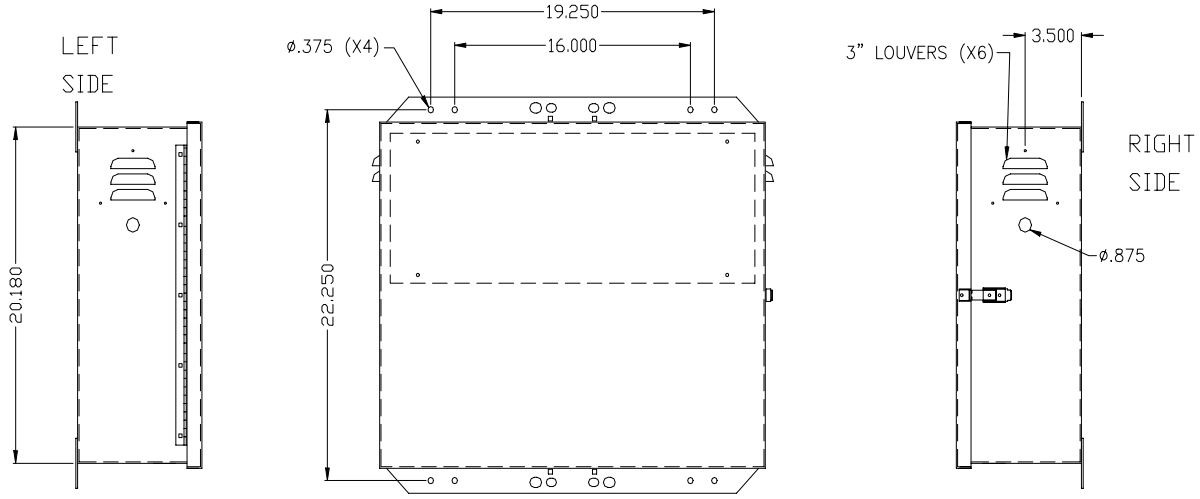
Specifications subject to change without notice.

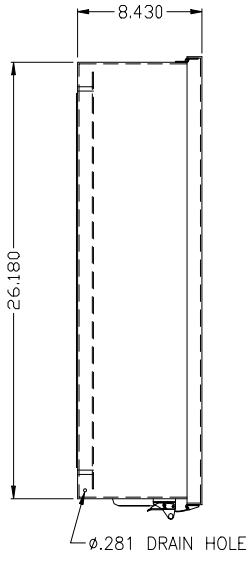
Atlantic Solar Products

9351-J Philadelphia Rd., P.O. Box 70060, Baltimore, MD 21237-6060
Phone 410-686-2500 Fax 410-686-6221

BE 26208 Battery Enclosure

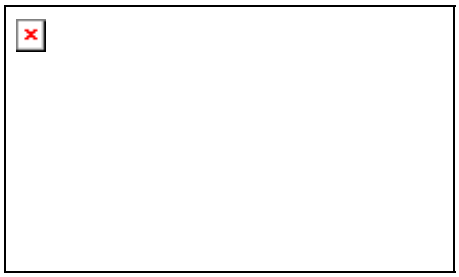
Fits up to two 105Ah Batteries end to end
Mounts on 2”- 4” Schedule 40 Pole
16” Centers
For larger poles use pipe strapping w/Optional Adapter





BOTTOM VIEW

NOTE:
1. 23.000 X 10.000 ALUM. BACK PANEL ON 1/4–20 X 1–1/4 CARRIAGE BOLTS.
2. HINGED DOOR WITH PULL DOWN LATCH WITH A PADLOCKABLE HASP SOUTHCO P/N 97–50–314–11
3. TOP AND BOTTOM MOUTING TABS.
4. BACK PANEL NOT SHOWN IN SIDE VIEWS FOR CLARITY.
5. SCREENED LOUVERS
6. USE 1–1/2” X 1/4” CLOSED CELL NEOPRENE GASKET.



Sweeping Pulse Technology

Every year millions of lead-acid batteries are prematurely discarded. Sulfation is the leading cause of these disposals and is the most destructive process determining the life of lead-acid batteries. Eight out of ten batteries are discarded as "dead", yet only suffer from this costly problem, a problem that can now be fully reversed and completely prevented.

During the normal discharge of a lead-acid battery, lead sulfate forms on the battery's plates. When recharged, this soft spongy material is converted back into the battery's electrolyte solution. When this material fails to release from the battery's plates, it begins to harden and crystallize. This destructive process is known as sulfation. Equalizing or over charging the battery was the only way, in the past, to remove the sulfation from the battery's plates. The very material that enables lead-acid batteries to release their energy and its out dated cure is what causes most batteries to fail.

Using Sweeping Pulse Technology will enable weak and dead batteries to provide a longer service life.

WHAT IS SWEEPING PULSE TECHNOLOGY?

Sweeping Pulse Technology is a patented, variable frequency, variable boost voltage process guaranteed to dissolve sulfate crystals back into the battery's electrolyte solution. All lead-acid batteries are adversely affected by the buildup of these deposits. As they collect on battery plates they restrict the flow of electrons and "lock away" active material required for normal operation. As this barrier becomes thicker and thicker, the battery's ability to accept a charge or deliver energy is drastically diminished, resulting in the perception that the battery is no longer usable.

Sweeping Pulse Technology allows the user to electronically dissolve sulfation formations back into the electrolyte solution without taking the battery out of service. Most importantly, if a new battery is equipped with Sweeping Pulse Technology it will always remain free and clean of sulfate crystals allowing it to operate unhampered at full capacity. This remarkable process generates no heat and can in no way harm the battery itself.

BENEFITS OF SWEEPING PULSE TECHNOLOGY

The principal benefit of Sweeping Pulse Technology is that it prevents the buildup of sulfate crystals on battery plates. Eliminating the number one cause of battery failure,

Sweeping Pulse Technology will significantly extend battery life.

Since the amount of exposed active plate surface is critical for determining battery output, a battery with clean plates and an unimpeded flow of electrons will accept a full charge and release all of its stored energy. Use of this leading edge technology will maintain battery efficiency.

Sweeping Pulse Technology can save money by reversing the capacity robbing effects of existing sulfation on batteries already in use and save even more by reducing man hours performing routine battery maintenance. Continual use of this technology will reduce battery disposal volumes, increase equipment readiness, and allow long term storage of batteries in a usable condition.

Whether you're a vehicle fleet manager, a solar system owner, or just a weekend marine enthusiast, use of Sweeping Pulse Technology will provide battery owners alike with these wide ranging benefits.

- Revert existing sulfate deposits
- Increase battery efficiency
- Prevent future sulfation
- Eliminate harmful overcharging
- Extend battery life
- Reduce hazardous material disposal
- Eliminate battery capacity loss
- Equalize battery using no heat
- Increase battery dependability
- Quicker recharge times
- Offset battery self discharge
- Increase freeze protection
- Reduce routine battery maintenance
- Decrease internal resistance
- Allow for long term battery storage
- Eliminate erroneous replacement

Model Number	Description
DS-500	Self-powered conditioner suitable for any type of battery set that is regularly recharged. The unit can be attached to the battery or the charging source output. Unit consumes only 4.8 watts a day. Specify unit voltage when ordering, 12, 24, 36, 48 or 72 volts. Up to 350 Amps Hours.
DS-1000	High output, self-powered conditioner suitable for any type of battery set (with battery capacities higher than 350 amp hours) that is regularly recharged. The unit can be attached to the battery or the charging source output. Unit consumes only 9.6 watts a day. Specify voltage when ordering, 12, 24, 36, or 48 volts. Up to 1000 Amp Hours.
T-360	AC powered, portable unit with heavy duty battery clips; maximum power 200 milliamps. Standard 120V input. 220V, 50Hz export unit available Suitable for RV's, fishing and sport boats.
DP-5000	120 volt AC input; up to 600 volts output. Suitable for high capacity battery banks.(220V, 50Hz export unit available)
S-100	12 volt solar powered conditioner/trickle charger. 1 watt solar charger will maintain up to 100 amp hours of battery capacity.
	Solar powered conditioner/trickle charger. 2.8 watt solar charger will maintain up to 180 amp hours of battery

S-280	capacity. Works with 12, 24 & 36 volt battery sets. Suitable or all mobile equipment.
S-550	Solar powered conditioner/trickle charger. 5.5 watt solar charger will maintain up to 360 amp hours of battery capacity. Works with 12 volt battery sets.
S-1000	Solar powered conditioner/charger. 10 watt solar charger will produce an average of 2.3 amp hours per day, maintaining up to 690 amp hours of battery capacity.
VC-4	High output solar charger. 10 watt, 12 volt solar charger will produce an average of 3.76 amp hours per day.
VC-5	High output solar charger. 10 watt, 24 volt solar charger will produce an average of 1.88 amp hours per day.

Camera Equipment

EX10 Series
Waterproof Resistant Camera

Key Features

- Injection molded Nylon housing
- Stainless steel hardware
- Clear polycarbonate window
- Protected, insulated environment with desiccant pack for humidity control
- 1/3” CCD Monochrome or color models
- Voltage regulation /Power protection
- Input power in 12 – 24 volts AC or DC
- Universal mounting bracket included
- Tested to – 60°C (- 76°F)
- IP67, NEMA 6, NEMA 6P Ratings for protection from rain, snow, circulating dust and temporary submersion.

Product Description

A two-piece injection molded design allows a watertight seal for IP67 and NEMA 6 & 6P ratings. Made of nylon and stainless steel, this compact egg shaped camera has remarkable performance for extreme environments:

The EX10 includes voltage regulation, spike protection, and 12 VDC or 24 VAC operations. Pre-wired with a 5-foot (1.6 m) pigtail for plug and play installation, the EX10 is available with fixed lenses from 3.6mm to 12mm.

A nylon wall bracket is included with each order. A stainless steel U-bracket can be ordered as no-charge option in lieu of the wall bracket.

Applications

- Wash down applications
- Food processing
- Clean rooms
- Marinas
- Acid / alkali environment
- Swimming pools
- Sewage Treatment plants
- Freezer Storage Plants
- Clean rooms

Product Image

Above ↑: A black EX10 with a clear (non-tinted) window can be installed to black ceilings in commercial and industrial locations for discrete surveillance without loss of any lux levels. The optional BRKU10 bracket shown is made of stainless steel.

Below ↓: The EX10 is packaged with a standard wall bracket BRKW10 that is also made of nylon.

Dealer/Distributor

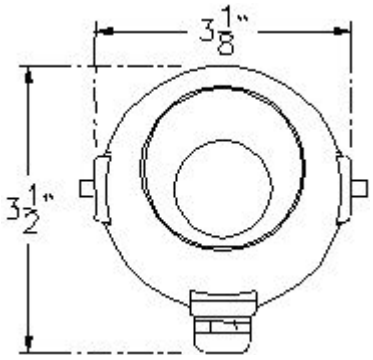
UK / Europe
USA / Canada
Toll Free (N.A.)

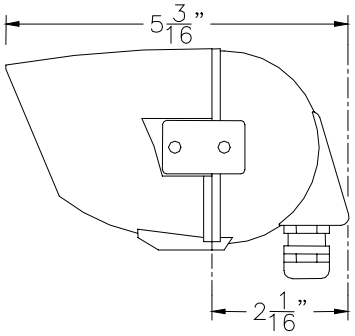
Tel: +44 (0) 1670 730 187
Fax: +44 (0) 1670 730 188
Tel: + 1.604.420.7711
Fax: + 1.604.420.3300
Tel: + 1.888.409.2288
www.ExtremeCCTV.com

Extreme CCTV®
SURVEILLANCE SYSTEMS

EX10 Series
Waterproof Resistant Camera

Technical Drawings





Specifications - EX10 S304

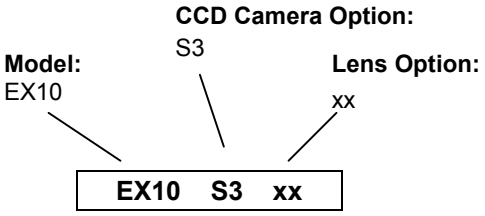
Example spec for S300 CCD – other CCDs available

Pick- up device	Mono 1/3" CCD B/W interline				
Resolution	>420 TVL				
Video output	1 V p-p, 75 Ohm, NTSC				
S/N	>50 dB				
Spectral sensitivity	400 to 940 nm				
Light sensitivity	0.05 Lux (F1.2)				
Electronic iris	1/60 to 1/100,000 second				
Auto gain control	>18dB				
Input power	12 VDC or 24 VAC				
Power consumption	<120mA at 12VDC				
Ambient operation temperature	-60° C to + 60° C (-76° F to +140° F)				
Fixed Lens (mm)	3.6	4.3	6.0	8.0	12
Viewing Angle (H)	68°	58°	42°	34°	23°
Enclosure	Injection molded nylon				
Max. Dimensions	132mm Length x 76mm Diameter (5-3/16" Length x 3" Diameter)				
Weight	375g (0.83 lb)				
Window	Polycarbonate (clear)				
Bracket "U"	U-bracket- stainless steel (optional)				
Bracket "W"	Reinforced nylon wall (standard)				

Note: All -50°C (and below) temperatures require special cold – crack cabling.

Part Numbers

(Other Special Order Models available on request)



CCD Camera Options:

C3	C300	Color 1/3" CCD 380 TVL
C7	C700	Color 1/3" CCD 480 TVL
S3	S300	Mono 1/3" CCD 420 TVL
S6	S600	Mono 1/3" CCD 600 TVL
SX4	SX400	Mono 1/3" LXR CCD 420 TVL
SX6	SX600	Mono 1/3" LXR CCD 600 TVL
CX4	CX400	Color 1/3" LXR CCD 380 TVL
CX6	CX600	Color 1/3" LXR CCD 480 TVL

Lens Options: (all micro type only)

Micro – Fixed Lenses – Replace xx with:

04 = 3.6mm **06** = 6.0mm **12** = 12mm
05 = 4.3mm **08** = 8.0mm

Accessories

EXPS.002	Power Supply, 12 VDC, 500 mA
BRKU10	Bracket, Ceiling U-Type for EX10
BRKW10	Bracket, Wall type for EX10
BRKD10	Bracket, D- type for EX10

Dealer/Distributor

UK / Europe
USA / Canada
Toll Free (N.A.)

Tel: +44 (0) 1670 730 187
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Fax: + 1.604.420.3300
Tel: + 1.888.409.2288
www.ExtremeCCTV.com

EX14MX.4-VA408
All-Environment MFP Camera

Key Features

- Extreme weather housing
- Injection molded ABS-Nylon resin enclosure
- Totally weatherproof for hot and cold environments
- Water-resistant
- Resistant to shock and impact
- Completely insulated internal chamber
- No requirement for internal heater or cooler
- 1/3” CCD, color / IR monochrome
- Installer-friendly, easy-access camera compartment
- IP66 compliant
- Extreme MFP Mechanical Filter technology
- Outstanding color imaging during day
- Exceptional Night Vision performance under infrared
- No focus shift or IR bleed
- Photocell-controlled Day-Night switching
- Varifocal 4.0-8mm auto-iris

Product Description

The EX14.MX4 is an all-environment camera for extreme weather applications. The simple, effective design allows performance under the most challenging of environmental conditions, including wash-down facilities, subzero temperatures and corrosive environments. The housing is compact, yet large enough to accommodate a 4-8mm varifocal lens and Extreme's mechanical filter imaging technology.

The EX14.MX4 incorporates Extreme’s MFP technology, a photocell-controlled filtering technique that eliminates problems such as focus shift and IR bleed. The result is an excellent 24/7 camera, with brilliant color performance during the day and exceptional Night Vision under infrared and low-light.

Made of an injection-molded ABS/Nylon resin, the EX14.MX4 is engineered specifically to withstand hot, cold and wet environments. A totally insulated inner chamber eliminates the requirement for internal heaters and blowers. Compliant to IP66, the EX14.MX4 also features an easy-access camera compartment for easy camera adjustments and installation.

The EX14.MX4 is ideal for extreme environment applications and comes complete with nylon wall bracket for fast and easy installation.

Product Images

Applications

- Wash down applications
- Food processing
- Outdoor environments
- Marine applications
- Artic conditions
- Acid / alkali environment
- Swimming pools
- Sewage Treatment plants
- Sub-zero weather applications
- Clean rooms
- Coastal environments
- Ports and harbours
- Industrial freezers and refrigerators

Dealer/Distributor

UK / Europe
Tel: + 44 (0) 1670 730 187
Fax: + 44 (0) 1670 730 188

USA / Canada
Tel: + 1 604 420 7711
Fax: + 1 604 420 3300

Toll Free (NA)
Tel: + 1 888 409 2288

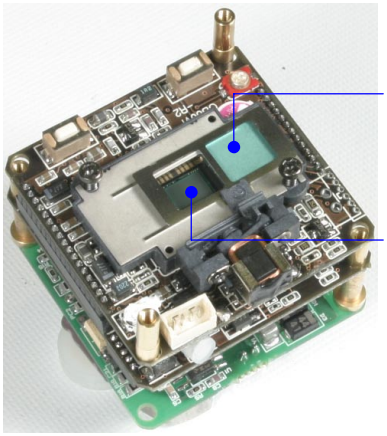
www.ExtremeCCTV.com

EX14MX.4-VA408
All-Environment MFP Camera

Technical Specifications

Construction	Injection-molded ABS / Nylon
Image Sensor	1/3'' LXR CCD
Lens	Varifocal 4.0-8mm Auto-iris, IR-optimised
Effective Pixels	NTSC: 765 (H) x 494 (V) PAL: 752 (H) x 582 (V)
Horizontal resolution	450 lines color imaging 570 lines B/W imaging
Scanning System	525 lines interlaced (NTSC) 625 lines interlaced (PAL)
Synchronization	Internal
Output Signal	Standard composite signal 1Vpp composite video into 75Ω
Sensitivity	0.2Lux with F2.0 lens Zero lux with infrared
Electronics Iris	1/60 ~ 1/100,000 (NTSC) 1/50 ~ 1/100,000 (PAL)
Signal to Noise Ratio	Greater than 46dB (AGC off)
Gamma	0.45
AGC	On (4-26dB max)
Input Voltage	12 VDC / 24 VAC
Power Consumption	2W or less
Internal Heater / Cooler	Not required
Window	Flame resistant VO-Margard
Operational Temperature*	-40°C to +50°C (-40ºF to 122ºF)
Storage Temperature	-50°C to +70°C (-58ºF to 158ºF)
Wall Bracket	Included
Color	Black
External Dimensions	180mm (l) × 85mm (w) × 85mm (h) 7.1" (l) x 3.3" (w) × 3.3" (h)
Internal Dimensions	100mm (l) × 60mm (w) × 60mm (h) 3.9" (l) × 2.4" (w) × 2.4" (h)
Diameter of Front Window	50mm (2.0")
Weight	0.7kg (bracket included)
Environmental	IP66 compliant
Weight	0.7kg (bracket included)

MFP Technology



Day: IR-cut filter delivers accurate color by filtering IR light

Night: IR-pass filter, photocell-controlled, allows optimal performance in dark

Conventional dual mode color / IR camera: Video taken without MFP technology suffers from IR bleed and poor quality color.

MFP Technology: The same scene shows excellent color performance under Extreme's mechanical filter technology.

A&E

Available upon request.

Please contact Sales@ExtremeCCTV.com

Dealer/Distributor

UK / Europe
Tel: + 44 (0) 1670 730 187
Fax: + 44 (0) 1670 730 188

USA / Canada
Tel: + 1 604 420 7711
Fax: + 1 604 420 3300

Toll Free (NA)
Tel: + 1 888 409 2288

www.ExtremeCCTV.com

EX82DXL
Dual Sensor IDN™ – Integrated Day Night

Key Features

- Advanced Twin Camera IDN™ camera
- Guaranteed superb color by day
- Guaranteed infrared monochrome by night
- Patent pending design
- 850nm or 940nm infrared illumination
- Control board for automatic IR on/off
- No “focus shift” problems
- Compact All-Weather housing
- Plug and Play installation
- Low voltage operation
- Low power consumption

Product Description

The EX82DXL is designed for the professional security provider who requires an easy to install fixed camera that performs without compromise on a 24-7 Day/Night basis.

A tough all weather housing with a 6mm Lexan window incorporates all of the EX82DXL’s electronics. Low voltage operation, solid state CCD technology and controlled regulated voltage means the EX82 will operate for years without servicing or maintenance.

Modelled after the award-winning EX38 IDN camera the EX82DXL is the first dual sensor IDN camera that incorporates LED Infrared and LXR CCD optics.

Day time – IR Off
High resolution color with auto-iris varifocal lens.

Night time – IR On
High Sensitivity infrared response with varifocal lens.

Product Image

Applications

- Perimeter surveillance
- Military bases
- Parking lots
- Commercial buildings
- High-end residential

Certification / Compliance

CSA-NRTL: LR 113310

Class: 2226 02 / 82 Commercial Video Equipment

Safety: OSHA / ANSI / UL / CSA Type 4x / NEMA 4x
CSA Std. C22.2 – Various Sections
UL 50 – Enclosures for Electrical Equipment
UL 2044 – Commercial CCTV Equipment

A&E

The camera shall be an IDN Integrated Day/Night camera to provide color by day and infrared enhanced vision by night. The camera shall create a minimum 20 db S/N picture at 100ft (30m) in zero Lux at total darkness. The camera shall consist of dual 1/3” CCD sensors, LXR type for night vision and Hyper Had for day vision. The camera shall be equipped with an infrared array of 90 LEDs attached to an efficient heat sink base and operating at 850 nanometers. Both sensors shall be equipped with 4-8 mm or 6-15 mm varifocal lenses. The color sensor lens shall be an auto-iris type. The camera shall switch from color mode to monochrome by way of a sensitivity-adjustable photocell. All of the electronic equipment shall be contained in a weatherproof and waterproof housing.

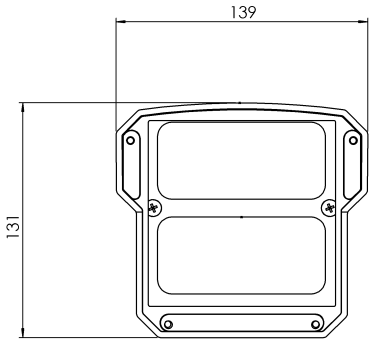
Dealer/Distributor

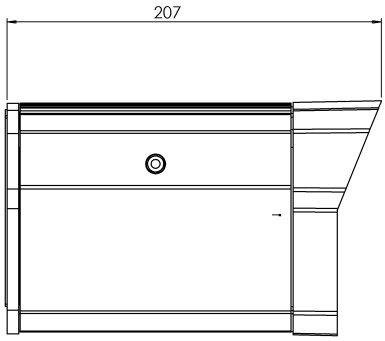
UK / Europe
USA / Canada
Toll Free (N.A.)

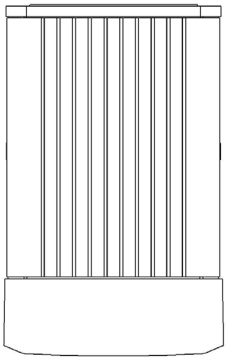
Tel: +44 (0) 1670 730 187
Fax: +44 (0) 1670 730 188
Tel: + 1.604.420.7711
Fax: + 1.604.420.3300
Tel: + 1.888.409.2288
www.ExtremeCCTV.com

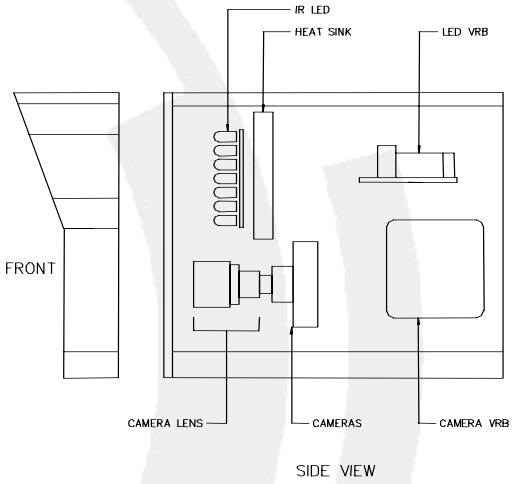
EX82DXL
Dual Sensor IDN™ – Integrated Day Night

Technical Drawings









Part Numbers

(Other Special Order Models available on request)

EX82 D8V4 b	EX82DXL, 850 nm, V4-8mm Lens - black
EX82 D8V4 w	EX82DXL, 850 nm, V4-8mm Lens - white
EX82 D8V8 b	EX82DXL, 850 nm, V6-15mm Lens - black
EX82 D8V8 w	EX82DXL, 850 nm, V6-15mm Lens - white
Special Order:	
EX82 D9V4b/w	as above with 940 nm LED's
EXMB.025	Wall Bracket - included
Optional:	
EXPS.008	PSU, 120 VAC / 24 VAC, 1.0A (NA)
PSU230/24	PSU, 230 VAC / 24VAC, 1.0A (Europe)

Specifications

(Other Special Order Models available on request)

EX82DXL- Dual Sensor Integrated Day Night (IDN) Camera

Pick Up Device	SX400 Mono LXR Med-Res 420TVL C700 Color CCD Hi-Res 480 TVL
Min. Illumination	ZERO (0) LUX – Operates in dark
Lenses	Varifocal Auto Iris - Day Lens 4-8mm or 6-15mm Varifocal - Night Lens
Infrared Illuminator	90 LEDs, Elliptical FHB Type 850nm or 940nm (optional)
Photocell	Control Pot Included
Power Control	VRB for 12VDC or 24VAC operation
Consumption	22 W max
Voltage	12 VDC or 24 VAC selectable
Construction	Robust Aluminium Casting
Window	6mm Polycarbonate on metal frame
Dimensions	131mm (H) x 139mm (W) x 207mm (D) 5.2" (H) x 5.5" (W) x 8.2" (D)
Weight	3.4 lbs (1.4 kg)
Operational Range	-50°C to +50°C (-58°F to +122°F)

Note 1: All -50°C (and below) temperatures require special cold-crack cabling.

Note 2: If installing multiple units from a common power supply, the power supply MUST provide individually isolated power to each unit. Contact Technical Support at Extreme CCTV for details.

Dealer/Distributor

UK / Europe
USA / Canada
Toll Free (N.A.)

Tel: +44 (0) 1670 730 187
Fax: +44 (0) 1670 730 188
Tel: + 1.604.420.7711
Fax: + 1.604.420.3300
Tel: + 1.888.409.2288
www.ExtremeCCTV.com

Extreme CCTV®
SURVEILLANCE SYSTEMS

EX27MNX.4-VA408
All-Weather MFP Day/Night Cameras

Key Features

- MFP Technology (Mechanical Filter with Photocell)
- 1/3" LXR CCD for excellent IR sensitivity, low smear, low streak and excellent anti-blooming characteristics
- Photocell-controlled switching between day and night
- Dual window (IR-Cut and IR-Pass) mechanical filter for optimized 24/7 performance
- Zero focus shift from color to IR modes
- Exceptional daytime color, outstanding night-time IR
- Integrated Day-Night (IDN™) design with 18 LEDs at 840nm for zero lux effectiveness
- Optimised LED Array for 40 feet of evenly-distributed active infrared Night Vision
- 12 VCD / 24 VAC operation, VRB power protected
- Separate, dedicated VRBs for CCD and IR Array ensures increased operational stability
- Cast & extruded aluminum
- Easy access for lens adjustments
- Varifocal 4-8mm auto-iris lens
- All-Weather sealed for extreme environments

Product Description

The EX27MNX.4 is an all-weather day/night camera that incorporates MFP Technology for exceptional day/night performance. Using mechanical filter technology, the EX27MNX.4 delivers brilliant color during the day and outstanding IR sensitivity at night.

The EX27MNX.4 uses Extreme's proprietary LXR CCD technology for outstanding spectral response in both visible and near infrared regions. The high-resolution sensor produces and amazing 570 TVL in monochrome and 450 TVL in color. As with all LXR-type sensors, the video signal is characterized by low-smear, low-streak and excellent anti-blooming characteristics.

An IR-Cut filter eliminates IR bleed during the day to ensure accurate color video. At night, a photocell-controlled IR-Pass filter optimises Night Vision performance. Together with a high-efficiency 18-LED infrared, the EX27MNX.4 delivers 40 feet of evenly-distributed Night Vision.

The EX27MNX.4 features an all-weather housing field-proven for successful application in extreme environments. The cast and extruded aluminum housing accommodates a 4-8mm varifocal, auto-iris lens for extra installation versatility.

Rugged, compact, power protected and extreme weather-sealed, the EX27MNX.4 is an ideal day/night camera for a wide variety of technical surveillance applications.

Product Image

Applications

- Commercial security
- Critical infrastructure
- Homeland security
- Public area surveillance
- Industrial sites
- Ports and harbors
- Schools, colleges and universities
- Outdoor surveillance
- Airports
- Extreme weather environments

Conventional dual mode color / IR camera: Video taken without MFP technology suffers from IR bleed and poor quality color.

MFP Technology: The same scene shows excellent color performance under Extreme's mechanical filter technology.

Dealer/Distributor

UK / Europe
Tel: + 44 (0) 1670 730 187
Fax: + 44 (0) 1670 730 188
USA / Canada
Tel: + 1 604 420 7711
Fax: + 1 604 420 3300
Toll Free (NA)
Tel: + 1 888 409 2288
www.ExtremeCCTV.com

EX27MNX.4-VA408
All-Weather MFP Day/Night Cameras

Specifications

(Other Special Order Models available on request)

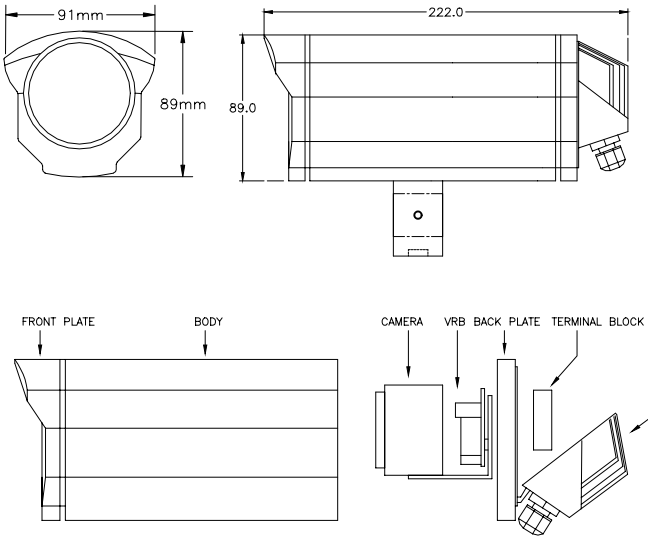
CCD Camera	MX400 (with MFP Technology)
Image Sensor	1/3" LXR Interline CCD
Filter	Dual-window mechanical type
Day-Night Switching	Photocell-controlled, automatic
LED Type	High-efficiency 850nm, even distribution IR
Number of LEDs	18
Lens	Varifocal 4-8mm, auto-iris
Effective Pixels	NTSC: 765 (H) x 494 (V) PAL: 752 (H) x 582 (V)
Resolution	450 lines color imaging 570 lines B/W imaging
Scanning System	525 lines interlaced (NTSC) 625 lines interlaced (PAL)
Output Signal	Standard composite signal 1Vpp composite video into 75 Ohms
Sensitivity - 30 IRE	0.2 Lux with F2.0 lens 0.0 Lux with infrared on
Electronics Iris	1/60 ~ 1/100,000 (NTSC) 1/50 ~ 1/100,000 (PAL)
S/N Ratio	Greater than 46dB (AGC off)
Gamma	0.45
AGC	On
Consumption	4.5W or less
Voltage	12 VDC or 24 VAC
Power Draw	540 mA @ 12 VDC, 6.5 W (max)
Construction	Robust aluminum casting / extrusion
Weight	3.1 lbs. (1.4 kg)
Color	Black (other colors by special order)
Mount	Double U-Mount Supplied with ¼-20
Environmental	IP66, NEMA 4 compliant
Temperature	-50°C to 50°C (-58°F to 122°F)
Wall Bracket	EXMB.023 (order separately)
Sunhood	EXSH.27 (order separately)

Note: Environments -50°C and below require cold-crack cabling.

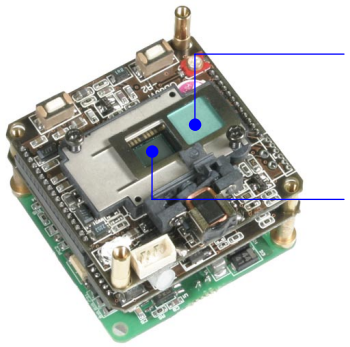
Certifications / Compliance

CSA Type 4X	Outdoor Weather Rating
CSA C22.2	General Electrical Requirements
UL Std No 50	Enclosures for Electrical Equipment
UL Std No 2044	Commercial CCTV Equipment

Technical Drawings



MFP Technology



Day: IR-cut filter delivers accurate daytime color by filtering IR light

Night: IR-pass filter, photocell-controlled, allows optimal performance in dark

Part Number

EX27MNX.4-VA408
1/3" LXR CCD, color / mono
High-efficiency 18 LED Array, 850nm
Photocell-controlled mechanical filter (MFP)
Varifocal 4-8mm auto-iris
All-weather housing, aluminum

Dealer/Distributor

UK / Europe
Tel: + 44 (0) 1670 730 187
Fax: + 44 (0) 1670 730 188
USA / Canada
Tel: + 1 604 420 7711
Fax: + 1 604 420 3300
Toll Free (NA)
Tel: + 1 888 409 2288
www.ExtremeCCTV.com

DTK-4TPV

Electrical Specifications

Class:	Low voltage protection for twisted pair video systems
Installation Point:	In series with the equipment to be protected
Connection Method:	Screw terminals, 14-26 awg wire
Continuous Current:	<150mAmps
Response Time:	<5 nSec
MCOV:	6.8VDC
AC Protection Modes:	L - G (All lines protected)
Service Voltage:	<5V
Max Surge Current:	120A (per pair)
Max Energy Dissipation:	1200 Watts (per pair)
Wiring Configuration:	2,4,6 and 8 wire Models Available
Typical Let Through Voltage:	6.8-8
Band Pass:	0-10Mhz
Insertion Loss:	<0.5dB @ 0-10Mhz

Physical Characteristics

Product Description:

Housing:	High impact plastic
Color	Black
Size	3.01 in. x 1.6 in. x 1.6 in.
Weight	0.200

Weather Sensors
and Related Equipment

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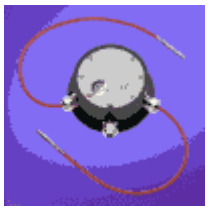
intelligent road sensor
miscellaneous



The LUFFT road sensor (incl. 2 external sensors) was designed to detect the road conditions.

It measures the following parameters :

- Temperature at road surface
- Freezing temperature
- Road conditions: dryness, moisture, wetness, remaining salt content, freezing wetness, ice and snow

The sensor has a very low power consumption and is powered by 12 V, nominal voltage.

Information about the road conditions are transmitted by the RS485-interface to a data processing system.

is accessory of

	product name	product group	ref.no.	
	data logger OPUS 200 data collectors	data logger	8160.00	info
	data logger OPUS 300 data collectors	data logger	8160.10	info

shopping basket

ref.no.: 8410.02

quantity ordered: 1 add to shopping basket

technical data

dimensions	Ø 120mm, height 50mm
detectable road conditions	dryness, moisture, wetness, remaining salt content, freezing wetness, ice or snow
weight	approx. 800g
storage temperature	-30...70°C
rated current	<200mA
interface	RS485, baud rate: 2,400...38,400 bit/s (default: 19,200) cable length : 25m standard, up to 100m possible
protection type	IP68
power supply	9...14VDC, nominal 12V
connector	CAGE CLAMP, WAGO (Δ <0,5mm)
operating temperature	-30...70°C
operating rel. humidity	0...100% r.h.

road dampness	
unit	dry/damp/wet
slippery road conditions	
unit	no ice/snow, snow, freezing rain, ice
temperature	
principle	NTC
measuring range	-30 ... 70 °C
accuracy	±0.2°C (-10...10°C), else ±0.5°
resolution	0,1 °C
freezing point	
measuring range	-20 ... 0 °C
accuracy	±1°C (t>-10°C)
resolution	0,1 °C

download

manual/GMA_e.pdf	Manual GMA (GB)
manual/IRS_20V1.25_e.pdf	Manual Intelligent Road Sensor (GB)

accessories

product name	product group	ref.no.	
isolated interface converter RS485-RS232	accessories	8410.KON2	info

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back

intelligent road sensor
miscellaneous

The LUFFT road sensor was designed to detect road conditions.

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is accessory of

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	data logger OPUS 200 data collectors	data logger	8160.00	info
	data logger OPUS 300 data collectors	data logger	8160.10	info

shopping basket

ref.no.: 8410.00

quantity ordered: 1 add to shopping basket

technical data

dimensions	Ø 120mm, height 50mm
detectable road conditions	dryness, moisture, wetness, remaining salt content, freezing wetness, ice or snow
weight	approx. 800g
storage temperature	-30...70°C
rated current	<200mA
interface	RS485, baud rate: 2,400...38,400 bit/s (default: 19,200) cable length : 25m standard, up to 100m possible
protection type	IP68
power supply	9...14VDC, nominal 12V
connector	CAGE CLAMP, WAGO (Δ <0,5mm)
operating temperature	-30...70°C
operating rel. humidity	0...100% r.h.

road dampness

unit	dry/damp/wet

slippery road conditions

unit	no ice/snow, snow, freezing rain, ice

road surface temperature

principle	NTC
measuring range	-30 ... 70 °C
accuracy	±0.2°C (-10...10°C), else ±0.5°
resolution	0,1 °C

freezing point

measuring range	-20 ... 0 °C
accuracy	±1°C (t>-10°C)
resolution	0,1 °C

download

manual/IRS_20V1.25_e.pdf	Manual Intelligent Road Sensor (GB)

accessories

product name	product group	ref.no.	
isolated interface converter RS485-RS232	accessories	8410.KON2	info

back

RADAR PRECIPITATION
RADAR REGEN SENSOR

- **maintenance-free**
- **rain-/snow differentiation**
- **precipitation amount (adjustable resolution 1mm, 0.1mm, 0.01mm)**
- **Interface: RS485 and 2 digital outputs**
- **compatible replacement of optical sensors (IRSS88)**
- **compatible replacement for tipping-bucket**

- ***wartungsfreier Niederschlagsgeber***
- ***Regen-/Schnee-Unterscheidung***
- ***Mengenbestimmung (Auflösung 1mm, 0.1mm, 0.01mm wählbar)***
- ***Interface: RS485 und 2 digitale Ausgänge***
- ***Konfigurierbar als Ersatz für IRSS88***
- ***Konfigurierbar als Ersatz für Wippe***

The R²S is equipped with a 24 GHz doppler-radar in order to measure the speed of rain or snow drops. Due to the correlation of drop size and speed, the precipitation amount is calculated.

Der R²S arbeitet mit einem 24 GHz Doppler-Radar, mit dem die Tropfengeschwindigkeit erfasst werden kann. Anhand der Korrelation von Tropfengrösse und Geschwindigkeit wird die Niederschlagsmenge berechnet.

ZERTIFIZIERT
DIN EN ISO 9001
NR 70100F222
DKD-K-26701
C E R T I F I E

G. LUFFT MESS- UND REGELTECHNIK GMBH
GUTENBERGSTR. 20
70736 FELLBACH

POSTFACH 4252
70719 FELLBACH
TEL. 49 (711) - 51822-0
FAX 49 (711) - 51822-41
INTERNET: http://www.Lufft.de
E-MAIL: Info@Lufft.de

Lufft

TECHNICAL DATA
TECHNISCHE DATEN

Historically:
The tipping-bucket/weight principle is being used for meteorological applications, enabling the measurement of the precipitation amount.

An optical sensor technology is applied for Road Weather Information Systems.

Both principals do not allow accurate determination of the type of precipitation through direct measurement.

Disadvantage: High maintenance due to build-up of dirt around the measuring device.

New:
maintenance-free radar-based precipitation sensor!

construction:
black aluminium sensor housing
10m lead cable
heated glass dome
weatherproof
easy installation

dimensions:
approx. Ø: 90mm, L: 200mm

Bisher:
Meteorologischer Bereich:
Im meteorologischen Bereich wird neben dem klassischen Kipplöffelprinzip immer häufiger die differentielle Gewichtsmessung eingesetzt.

Verkehrs-Meteorologie:
Lichtschrankenprinzip.
Eine Unterscheidung zwischen Schnee und Regen ist bisher bei keinem der Verfahren über die direkte Messung möglich.

Großer Nachteil: permanente Wartung durch Verschmutzung der Sensorik.

Neu:
wartungsfreier Radar-Niederschlagssensor!

Konstruktion:
Montagefreundlicher Aufbau,
incl. 10m Anschluss-Kabel
Glaskuppel beheizbar
Sensorgehäuse aus Aluminium schwarz eloxiert

Abmessungen:
ca. Ø: 90mm, L: 200mm

Best.Nr./Ref.No 8367.00

SYMBOL	PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
UB	Input Voltage	protected	10	12	15	V
IB0	Input current	Sleepmodus, U_RS485 = 0V	0		2	mA
IB1	Input current	Radar measurement active		100		mA
t_Radar	measurement time	set through software	15		60	sek.
T_Radar	measurement interval	set through software	1		10	Minuten
UH	heating voltage	isolated from UB	12	24	30	V
PH	heating power	UH=24V		30		W
Uout1/2H	output voltage	High Pegel, Iout < -10mA	UB-2V		UB	V
Uout1/2L	output voltage		0		1	V
Temp	operating temperature range		-30		70	°C
Hum	operating humidity range		0		100	%
Dmess	drop size		0,5		8	mm

SYMBOL	*PARAMETER*	*BEMERKUNGEN*	*MIN*	*TYP*	*MAX*	*EINHEIT*
UB	*Eingangsspannung*	*Verpolgeschützt*	*10*	*12*	*15*	*V*
IB0	*Eingangsstrom*	*Sleepmodus, U_RS485 = 0V*	*0*		*2*	*mA*
IB1	*Eingangsstrom*	*Radarmessung aktiv*		*100*		*mA*
t_Radar	*Messzeit*	*Konfigurierbar über SW*	*15*		*60*	*sek.*
T_Radar	*Messintervall*	*Konfigurierbar über SW*	*1*		*10*	*Minuten*
UH	*Heizungsspannung*	*Galvanisch getrennt von UB*	*12*	*24*	*30*	*V*
PH	*Heizleistung*	*UH=24*		*30*		*W*
Uout1/2H	*Ausgangsspannung*	*High Pegel, Iout < -10mA*	*UB-2V*		*UB*	*V*
Uout1/2L	*Ausgangsspannung*		*0*		*1*	*V*
Temp	*Zul. Temperatur*		*-30*		*70*	*°C*
Hum	*Zul. Feuchte*		*0*		*100*	*%*
Dmess	*Tropfengrösse*		*0,5*		*8*	*mm*

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Lufft

High Performance
Wind Sensor

YOUNG

Model 05103
Wind Monitor

The Wind Monitor is a high performance, rugged wind sensor. Its simplicity and corrosion-resistant construction make it ideal for a wide range of wind measuring applications.

The wind speed sensor is a four blade helicoid propeller. Propeller rotation produces an AC sine wave voltage signal with frequency directly proportional to wind speed. Slip rings and brushes are eliminated for increased reliability.

The wind direction sensor is a rugged yet lightweight vane with a sufficiently low aspect ratio to assure good fidelity in fluctuating wind conditions. Vane angle is sensed by a precision potentiometer housed in a sealed chamber. With a known excitation voltage applied to the potentiometer, the output voltage is directly proportional to vane angle. A mounting orientation ring assures correct realignment of the wind direction reference when the instrument is removed for maintenance.

The instrument is made of UV stabilized plastic with stainless steel and anodized aluminum fittings. Precision grade, stainless steel ball bearings are used. Transient protection and cable terminations are in a convenient junction box. The instrument mounts on standard 1 inch pipe.

For offshore and marine use, the **Model 05106, Wind Monitor-MA** features special waterproof bearing lubricant and a sealed, heavy-duty cable pigtail in place of the standard junction box. Separate signal conditioning for voltage or current outputs is available.

The Wind Monitor is available with two additional output signal options. **Model 05103V** offers calibrated 0-1 VDC outputs (0-5 VDC optional), convenient for use with many dataloggers. **Model 05103L** provides a calibrated 4-20 mA current signal for each channel, useful in high noise areas or for long cables (up to several kilometers). Signal conditioning electronics are integrated into the sensor junction box.

Ordering Information — MODEL

WIND MONITOR	**05103**
WIND MONITOR 0-1 VDC OUTPUTS	**05103V***
WIND MONITOR 4-20 mA OUTPUTS	**05103L***
WIND MONITOR-MA (MARINE MODEL)	**05106**
WIND SENSOR INTERFACE (FOR USE WITH 05106) 0-1 VDC	**05603B***
WIND LINE DRIVER (FOR USE WITH 05106) 4-20 mA	**05631B***

**** SPECIFY SUFFIX FOR DESIRED WIND SPEED SCALE:***

0-50 M/S	***ADD SUFFIX "M"***
0-100 MPH	***ADD SUFFIX "P"***
0-100 KNOTS	***ADD SUFFIX "N"***
0-200 KM/HR	***ADD SUFFIX "K"***

Specifications

Range:
Wind speed: 0-60 m/s (134 mph)
Gust survival: 100 m/s (220 mph)
Azimuth: 360° mechanical, 355° electrical (5° open)

Accuracy:
Wind speed: ±0.3 m/s (0.6 mph)
Wind direction: ±3 degrees

Threshold:*
Propeller: 1.0 m/s (2.2 mph)
1.1 m/s (2.4 mph) 05106
Vane: 1.1 m/s (2.4 mph) 05103

Dynamic Response:*
Propeller distance constant (63% recovery) 2.7 m (8.9 ft) Vane delay distance (50% recovery) 1.3 m (4.3 ft)
Damping ratio: 0.3
Damped natural wavelength: 7.4 m (24.3 ft)
Undamped natural wavelength: 7.2 m (23.6 ft)

Signal Output:
Wind speed: magnetically induced AC voltage, 3 pulses per revolution. 1800 rpm (90 Hz) = 8.8 m/s (19.7 mph)
Azimuth: analog DC voltage from conductive plastic potentiometer- resistance 10K Ω, linearity 0.25%, life expectancy- 50 million revolutions

Power Requirement:
Potentiometer excitation: 15 VDC maximum

Dimensions:
Overall height: 37 cm (14.6 in)
Overall length: 55 cm (21.7 in)
Propeller: 18 cm (7 in) diameter
Mounting: 34 mm (1.34 in) diameter (std. 1 inch pipe)

Weight:
Sensor weight: 1.0 kg (2.2 lbs)
Shipping weight: 2.3 kg (5 lbs)

*Nominal values, determined in accordance with ASTM standard procedures.

MODEL 05103V 0-1 VDC outputs

Power Requirement:
8-24 VDC (5 mA @ 12 VDC)

Operating Temperature:
-50 to 50° C

Output Signals:
0-1.00 VDC full scale
0-5.00 VDC optional

MODEL 05103L 4-20 mA outputs

Power Requirement:
8-30 VDC (40 mA max.)

Operating Temperature:
-50 to 50° C

Output Signals:
4-20 mA full scale

YOUNG

R.M. YOUNG COMPANY
2801 Aero Park Drive
Traverse City, Michigan 49686 U.S.A.
TEL: (231) 946-3980 FAX: (231) 946-4772
E-mail: met.sales@youngusa.com
Web Site: www.youngusa.com

1-Wire Specifications

Close Window

WINDSENSOR

Size: 21" wide, 12" tall, 4" deep, 20' cable w/RJ-11 connector
Temperature range: -40 to +120 degrees F
Wind direction: 16 points
Wind speed: 1 to 200 mph ±1%

BAROMETRIC PRESSURE

Size: 2.3" wide, 2" tall, 1.7" deep, 12' cable w/RJ-11 connector
Temperature range: -40 to +120 degrees F
Pressure range: 28 to 34 inches Hg ±2%
Pressure resolution 0.01 inches Hg
Pressure accuracy: ±.03 at 75 degrees F

HUMIDITY/TEMPERATURE

Size: 2.3" wide, 1" tall, 1.7" deep, 20' cable w/RJ-11 connector
Temperature range: -40 to +120 degrees F,
Temperature accuracy (-10 to +85 deg. C) 1 degree F
Humidity range: 0 to 100% inches Hg ±3%

LEAF WETNESS SENSOR

Size: 15”long x 4”x 4.5”, Weight: 17oz., Cable Length: 20 feet
Temperature operating range: 32 to +120 degrees F,
Sensor: PCB with gold plated grid
Input pull up: 470 Kohms

LIGHTNING SENSOR

Size: 12" long x 11" tall x 3" wide, 20' cable w/RJ-11 connector

RAIN COLLECTOR

Size: 7.7" wide, 7.5" tall, 15.5" deep, Receiving Orifice Diameter 6.00"
Temperature Operating range: 32 to +120 degrees F, Temperature Limits -50F° to +130F°.
Resolution 0.01 inches Accuracy: ±1% @ 1" per hour

MF-1330, 31 & 32

MF-1330, 31 & 32 TOWER PACKAGE INCLUDES:

- Concrete Footing Section
- Manufactured of anodized aluminum.
- Fold-Over Assembly
- 30' Tower
- 5' aluminum Mast
- Lightning Rod & 8' Ground Rod Kit
- Secured winch for added safety and reliability

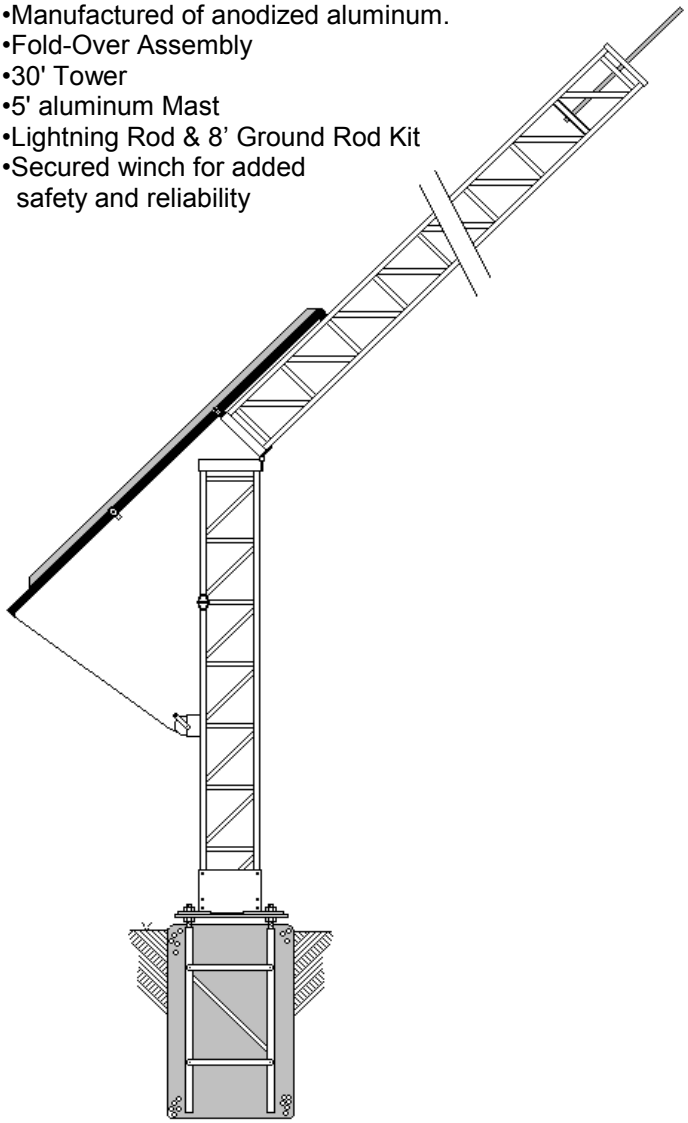


Table of BOCA Code Requirements

Maximum allowable sq. ft. area of attached equipment at specified **height above ground or guy wires, whichever is higher.**

	Wind MPH				
Height	**70**	**80**	**90**	**100**	**110**
10'	71	52	40	33	26
15'	43	31	23	18	13
20'	28	19	13	9	6
25'	15	9	4	1	—
30'	8	3	1	—	—
35'	3	—	—	—	—
40'	—	—	—	—	—

Design Specifications

Tower Height	**30 feet**
Mast Length over tower	**3 feet**
Fold-over hinge height	**10 feet**
Tower side width	**12 3/4"**
Length of each section	**10 feet**
Maximum allowable vertical load on 1 siderail leg	**8750 lb.**
Hardware	**18-8 SS**
Weight per section	**29 lb.**
Total shipping weight	**300 lb.**
Concrete Base width	**36"**
Concrete base depth	**45"**
Cubic yards concrete	**1.25**
Max. allowable equipment deadweight at 33 foot level	**20 pounds**
Meets BOCA-UBC-EIA-AASHTO Building Codes	

Ordering Information

Model No.	Description- Variance in base assembly
MF-1330	**30' Fold-over with level base**
MF-1331	**30' Fold-over with fixed base**
MF-1332	**30' Fold-over with temporary base**

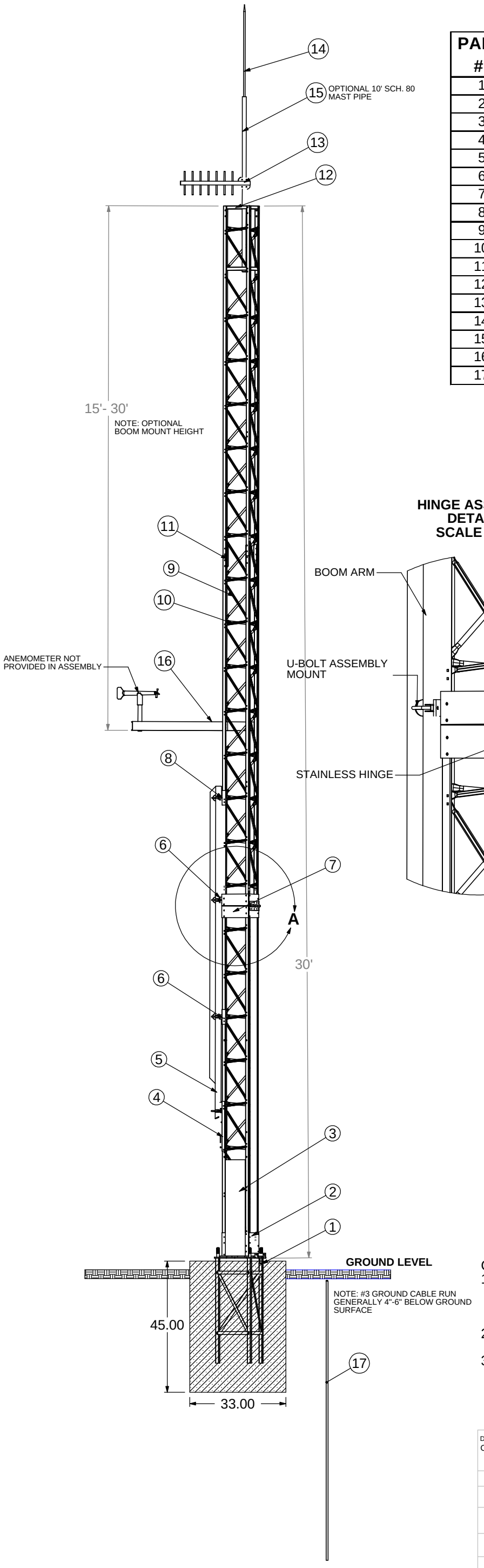
GLEN MARTIN ENGINEERING

Mailing Address
Glen Martin Engineering, Inc.
13620 Old Hwy 40
Boonville, MO 65233 USA

Contact Information
tel (660) 882-2734
fax (660) 882-7200
info@glenmartin.com

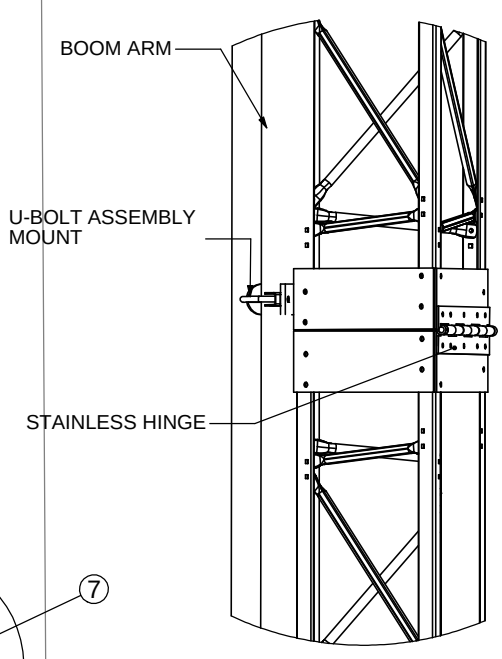
Website
www.glenmartin.com

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

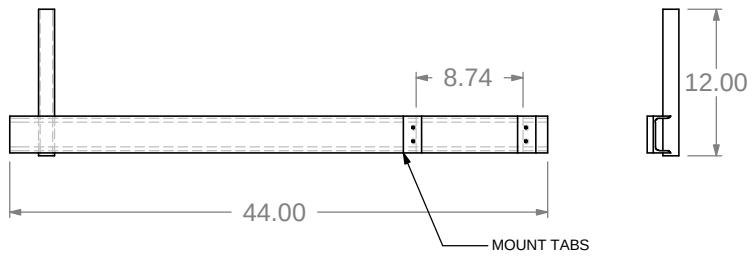


PART #:	QTY:	NAME	DESCRIPTION
1	1	CHB-13	HINGE BASE FOOTING ASSEMBLY
2	2	HB-13	HINGE BASE ASSEMBLY
3	3	AC-1300	3 SIDED ANTI-CLIMB PANEL OPTION
4	1	1415	WINCH PLATE AND LOCK PAD
5	1	O715	BOOM
6	1	1516	SADDLE BRACKET PLATE
7	1	O615	HINGE ASSEMBLY
8	1	O115	SADDLE BRACKET PLATE
9	66	CROSS 16	DIAGONAL
10	66	CROSS 12	HORIZONTAL
11	3	COUPLERS	TOWER SECTION COUPLER V
12	2	CM-1300	CENTER TOWER MOUNT
13	1	YAGI ANT.	PROVIDED BY CUSTOMER
14	1	LR-8400	LIGHTNING ROD ARRESTOR KIT
15	1	MA-5050	1-5/16" OD x 60" .145 Wall AL6061 MAST
16	1	BM4400	44" BOOM MOUNT
17	1	GR-5080	GROUND ROD

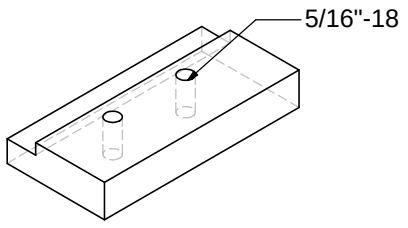
HINGE ASSEMBLY
DETAIL A
SCALE 1 : 12



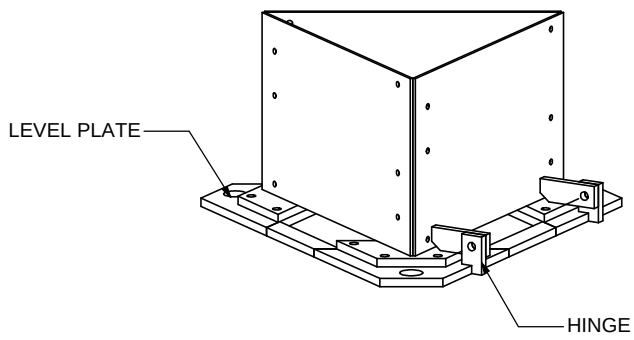
ANEMOMETER SIDE ARM
SCALE 1:15



MOUNT TAB
SCALE 1:2



HB-13 "HINGE BASE"
SCALE 1:8



GENERAL NOTES:
1) TOWER DESIGNS ARE IN ACCORDANCE WITH APPROVED STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES, AND TRAFFIC SIGNALS 1994 [AASHTO].
2) DO NOT INSTALL OR DISMANTLE FOLDOVER TOWER WITHIN FALL DISTANCE OF ELECTRICAL AND/OR TELEPHONE LINES.
3) REQUIRED MINIMUM CONCRETE FOOTING 1.1 CUBIC YARDS. BASED ON NORMAL SOIL CONDITIONS. GEOTECHINCAL SERVICES AVAILABLE THROUGH GLEN MARTIN ENGINEERING TRAINED PROFESSIONAL GROUP UPON REQUEST.

DO NOT MANUALLY UPDATE
CAD GENERATED DRAWING,

APPROVALS CHECKED DATE

DRAWN CJM 11/20/00

RESP ENG BMA 11/26/00

MFG ENG

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
+ .XX+/- .01 + 1
.XXX+/- .005

DWG. NO.

MATERIAL AL 6061 T6

FINISH ANODIZED

CAD FILE: /MF-1330[ANTICLIMB]

Glen Martin Engineering, Inc.
13620 Old Hwy 40
Boonville, MO 65233
Tel: (660) 882-2734
Fax: (660) 882-7200
www.glenmartin.com

MF-1330 FOLDOVER ANTICLIMB PANELS

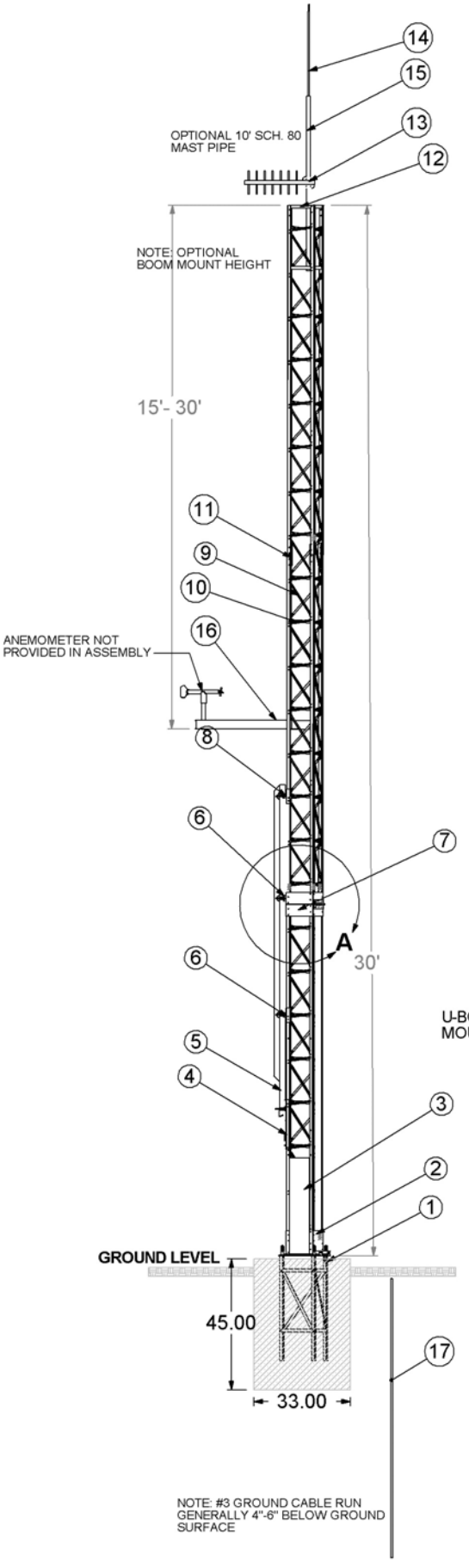
SCALE 1:30

QTY REQD

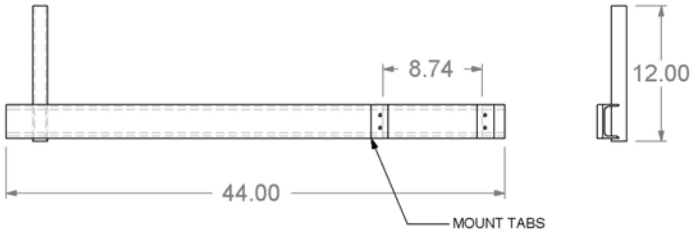
REV. 1

SHEET 1 OF 1

MF-1330, 31 & 32 Specifications



ANEMOMETER SIDE ARM
SCALE 1:15



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10	66	CROSS 12	HORIZONTAL
11	3	COUPLERS	TOWER SECTION COUPLER V
12	2	CM-1300	CENTER TOWER MOUNT
13	1	YAGI ANT.	PROVIDED BY CUSTOMER
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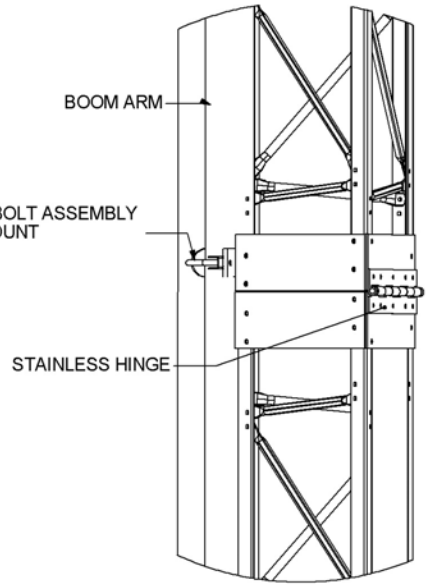
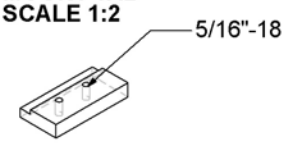
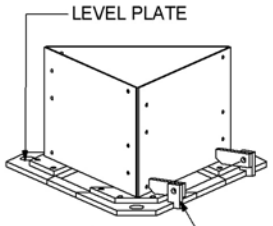
16	1	BM4400	44" BOOM MOUNT
17	1	GR-5080	GROUND ROD

HINGE ASSEMBLY
DETAIL A
SCALE 1 : 12



MOUNT TAB
SCALE 1:2





HB-13 "HINGE BASE"
SCALE 1:8

GENERAL NOTES:
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3) REQUIRED MINIMUM CONCRETE FOOTING 1.1 CUBIC YARDS. BASED ON NORMAL SOIL CONDITIONS. GEOTECHINCAL SERVICES AVAILABLE THROUGH GLEN MARTIN ENGINEERING TRAINED PROFESSIONAL GROUP UPON REQUEST.

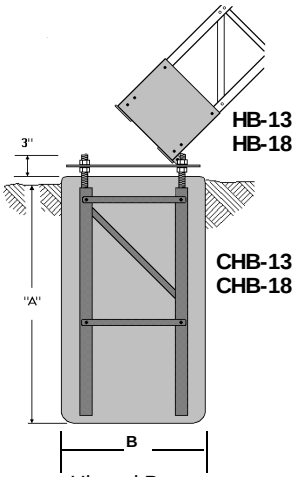
TOWER FOOTINGS

GME manufactures tower foundations in three distinct configurations.

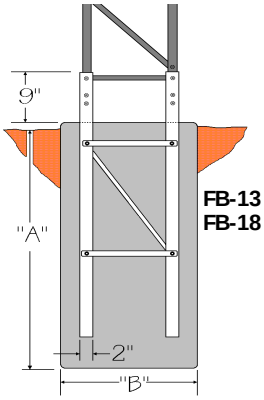
CHB-13/18: The basic foundation is our hinged base set on a concrete anchor (CB-13 & HB-13 or CB-18 & HB-18). This base allows the entire tower to be assembled on the ground, attached to the base and hinged into position. Once erect, tower plumb is easily fine tuned via leveling bolts in the base.

FB-13/18: An alternate method is to install a fixed concrete (non-hinging) base (FB-13 or FB-18). The tower's first section and concrete base need to be plumbed and braced before the concrete is poured.

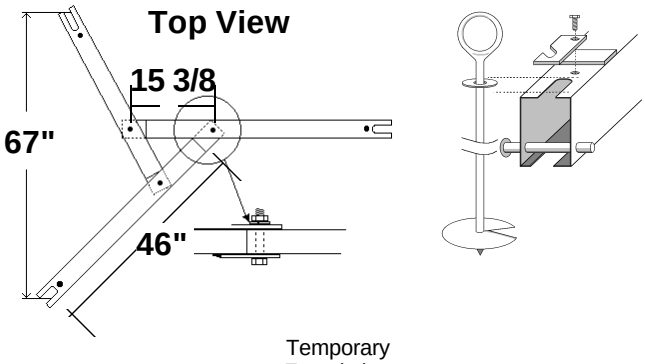
TF-1300: For temporary installations, our TF-1300 Temporary Footing employs three earth screws to provide a secure footing without the need for concrete. The TF-1300 is available for M-13 towers. It is used in conjunction with our HB-13. Simply screw base to the ground and hinge the tower into position.



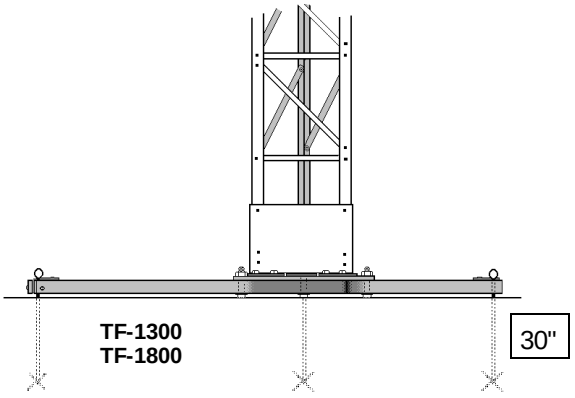
Hinged Base Foundation



Fixed Base Foundation



Temporary Foundation



Temporary Foundation

FOUNDATION SPECIFICATION

Tower Model	"A"	"B"	Cu. Yards. Concrete
M-13	45"	36"	1.25
M-18	48"	48"	2.5

ORDERING INFORMATION

Item No.	Description
FB-13	Fixed base for M-13
FB-18	Fixed base for M-18
CHB-13	Concrete footing for HB-13
HB-13	Hinge base for M-13
CHB-18	Concrete footing for HB-18
HB-18	Hinge base assembly for M-18
TF-1300	Temporary footing for M-13
TF-1800	Temporary footing for M-18

GLEN MARTIN ENGINEERING

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Boonville, MO 65233 USA

Contact Information
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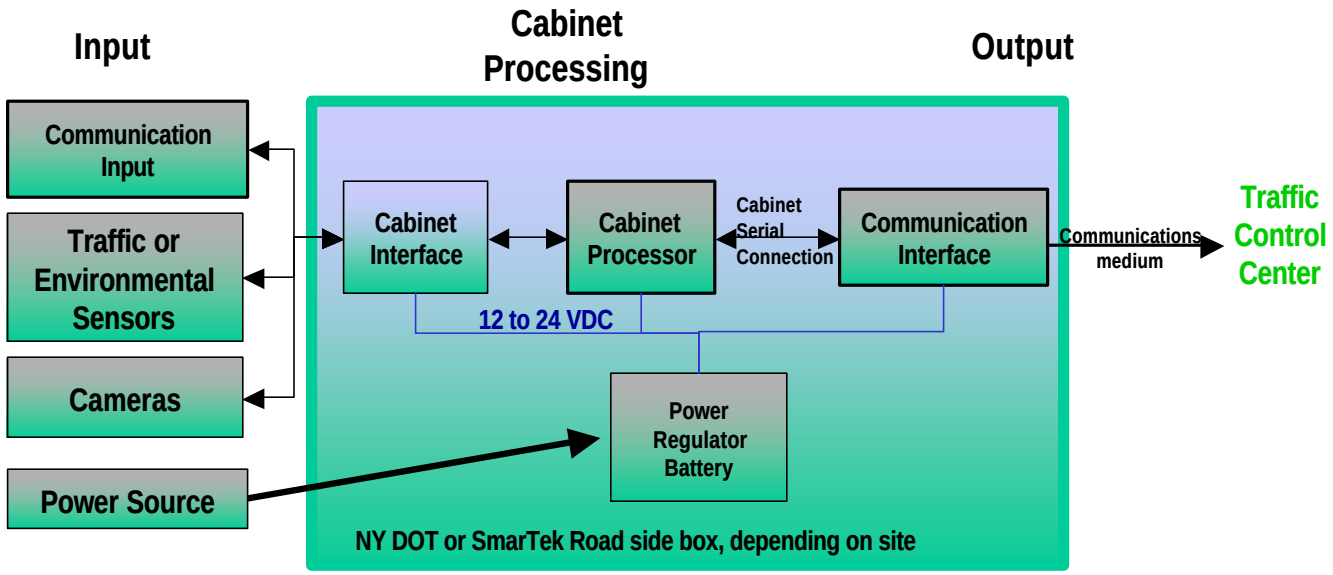
fax (660) 882-7200
info@glenmartin.com

Website
www.glenmartin.com

Bundled Configurations

General Traffic Monitoring Site



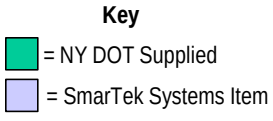
Each site has three general functions associated with its operation. These functional areas: Input, Cabinet Processing, and Output are common to all sites. Each functional area has several different options which are determined by the type of sensors used at the site and ultimately the information required from the site.

Beginning on page 3-8, several different sensor and power configurations are outlined for cabinet input, several different interface and processing combinations to acquire the various types of sensor data or video imagery, process traffic and weather alerts, and the necessary communications interface to pass the output information along to the next site, a PC momentarily connected to the site or a control center needing the information.

All of the general components within the functional areas are to be considered optional, driven by existing site hardware or customer data requirements. The illustrations that follow are not to be considered all inclusive. They are intended to be tailored as necessary to meet operational requirements on a case by case basis.

Each site will also have a power supply option, based on the availability of AC power or the necessity to operate on solar power. All of the sites will require power for continuous operation. The power options are outlined on page 3-2.

Each site requires a data connection or communication method to deliver the information. Several communications options are outlined on page 3-5.



Throughout the examples which follow, a color code is used to indicate which options are supplied by NY DoT or SmarTek Systems. The color key is at the left, with boxes combining the two color indicating the option can be supplied by either party as site needs dictate.

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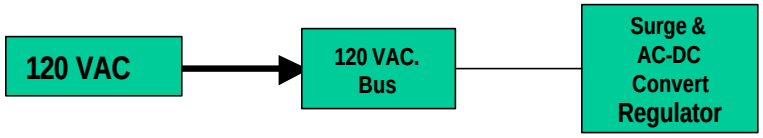
Power Supply Options

One of the primary considerations when installing a new site or revitalizing an existing site is the ability to power the site. It can be a logistical nightmare if existing power is not already available to a remote site. If AC power is available, and the site is to be used for continuous, real-time operation, then a power backup plan should be considered for AC service interruptions.

As shown in the various configuration diagrams, two primary power sources are offered -- standard 120 VAC provided by the local power company or solar power generated by a local solar collector panel. Those Power Supply Options supplied by SmarTek have a regulator and battery for those times when AC power fails or periods of cloudy weather prevail.

AC Powered Options

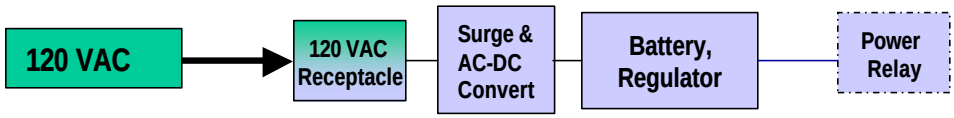
The AC Power Option comes in two versions. The first is the traditional traffic cabinet power supply which would already be in place at a typical Type 170 traffic controller site. SmarTek equipment would simply plug into the existing power supply used by the controller, such as the SAS Relay Interface and SAS-CT directly into a card file.



Typically, 120 VAC hook-up is brought into a circuit breaker mounted on the outside of the cabinet. Power is brought into a duplex outlet (with GFI protection) for 120 AC power.

An AC Surge protector/strip & 2 AC-DC Converters (redundant smaller ones rather than 1 large big one)or 1 AC-DC converter supplies unregulated power.

Supplied with 12 to 24 VDC, a SunSaver Battery Regulator with a low voltage disconnect provides a stable bus voltage and controls the voltage charge of the battery. The appropriate deep cycle battery should be sized to provide at least 5 days of autonomy.



The second type of AC site would be used where power is provided to a roadside cabinet, but a traffic controller supply is not available or slated for use. A typical situation is when roadside equipment is being used to monitor traffic and weather conditions. Here power is converted to DC voltage and stored for periods of AC power loss in a battery. An optional cabinet Power Relay Module is available to reset cabinet equipme nt by temporarily interrupting and restoring the battery power to the equipment. The relay is usually controlled by the cabinet watch dog timer.

Key

= NY DOT Supplied

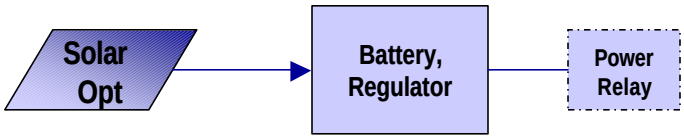
= SmarTek Systems Item

= NY DOT or SmarTek Supplied, depending on site

Power Supply Options, Continued

Solar Powered Option

When AC power is not available or desirable, providing DC Power to a cabinet regulator and battery are a second option. An appropriately sized solar panel and battery is one method of collecting and providing for power at the site. An optional cabinet Power Relay Module is available to reset cabinet equipment by temporarily interrupting and restoring the battery power to the equipment. The relay is usually controlled by the cabinet watch dog timer described elsewhere.



The solar panel and companion mounting hardware are sized to provide sufficient charging capacity to recharge the site in a typical Jan.-Feb. day at a particular latitude and site solar map history. Inputs to the sizing calculation also include the site power budget, winter temperature profile and days of autonomy required. Hardware also includes 10 to 14 gauge hook-up wire and protective diodes for the panels if required.

Supplied with varying charging voltage from the solar panel, an appropriately sized SunSaver Battery Regulator with a low voltage disconnect provides a stable bus voltage and controls the voltage charge of the battery. The charger is sized to provide maximum charging during peak sun exposure. The appropriate deep cycle battery should be sized to provide at least 5 days of autonomy.

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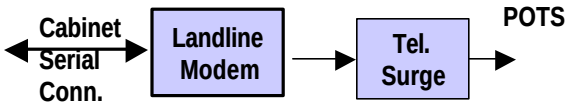
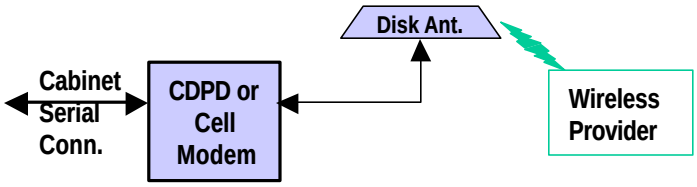
Communications Options

Whether establishing a information network or plugging into an existing infrastructure, connecting a remote site to the ultimate user is always a challenge. Several device and cabinet communications options may be provided to help solve this issue. All options in this listing begin at a serial port within the cabinet and connect the cabinet via selected device which is available or best suited for the type of data being collected at the site. All cabinet equipment options have been chosen to minimize the bandwidth required. This saves power and provides the opportunity to choose the lowest cost option without sacrificing data content, making all of these options viable.

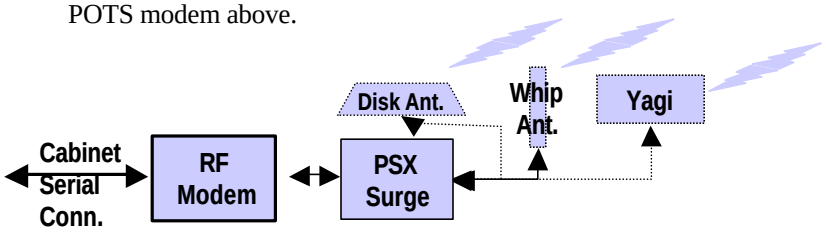
Modem Options



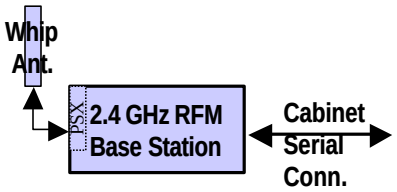
Using a wide temperature range modem to connect a control center or data collection point via Plain Old Telephone System (POTS) lines is one of the simplest means of communication with a site. A telephone line surge protector is highly recommended.



A wide temperature range CDPD modem provides IP connectivity to a control center or data collection point via a wireless provider. In most areas, a low profile disk antenna is preferable to a whip antenna due to maintenance and external appearance issues (attracts less attention). A cellular modem may be substituted for the CDPD modem in this option. The Cell Modem would then be dialed just like a POTS modem above.



The 2.4 GHz RF modem, internal or in a separate enclosure, connects either a remote sensor or complete data site to a base station or data collector hub. In-line surge protection is provided where external antennas, such as an optional disk, whip or Yagi is connected separately from the RF cabinet or sensor.



The 2.4 GHz RF modem connects the data collector to either a remote sensor or complete data site. In-line surge protection is provided inside the NEMA enclosure where external antennas, such as an optional whip, is mounted apart from the enclosure.

Key

= NY DOT Supplied
= SmarTek Systems Item
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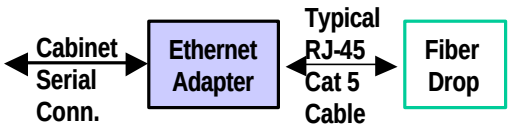
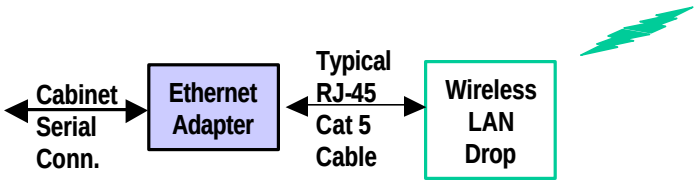
Other Communications Options

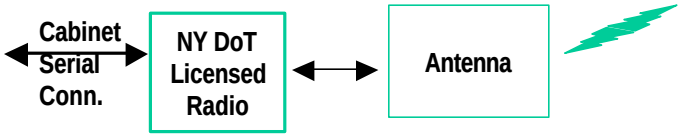
The hardware SmarTek provides is able to be used with existing networks and radio connections as well. This allows the user to capitalize on existing infrastructure to minimize the effort for connecting a site. Some examples are shown here. All assume a serial connection between the cabinet processing device and the interface to the outside world. This simplifies overall system configuration and reduces the number of different configurations of equipment a user must maintain.



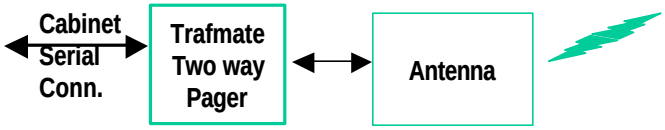
To add a site to an existing fiber network, an individual sensor or data collection site has Ethernet adapter added (with programmable IP address) which then connects to the fiber drop on the network.



Similarly, an individual sensor or data collection site is connected via an Ethernet adapter to a wireless LAN (802.11b or equivalent). The Ethernet adapter has a programmable IP address.



Just like connecting via a 2.4 GHz SAS-RFM, the remote site may be connected via a licensed radio modem provided by NY DoT which sends data to a central point.



Utilized primarily by traffic planners, the remote site is connected via Trafmate data collection device and two-way pager manufactured by TrafInfo.com. This relatively low bandwidth solution is currently not a cost effective way to transmit traffic images.

Key

= NY DOT Supplied

= SmarTek Systems Item

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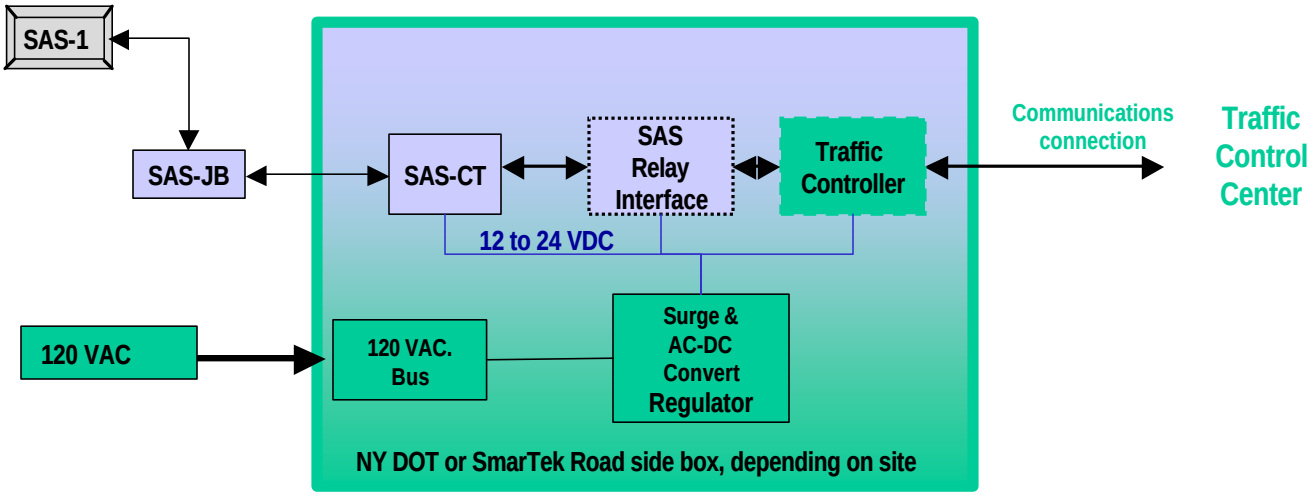
Configuration 1 -- SAS-1with Relay Interface

A General System Architecture for Traffic Monitoring



General description:

This an illustration of the typical system architecture, where SAS-1 is being used to replace traditional loops as a traffic detection sensor. SAS-1 is a non-embedded, side fire traffic detector that monitors 5 lanes of traffic, providing true presence or volume, occupancy and speed on a per lane basis. The SAS-JB provides a means of connecting a long home run, up to 2000 feet, to the control cabinet via RS-422 cable. The site's only sensor input is the SAS-1 detector. The SAS-1 is set up to provide a single or dual loop emulation in the ITS configuration, or it may be used as a true presence detector in the configuration at traffic intersection stop lines. Inside the cabinet, the SAS-CT converts the RS-422 to RS-232 signals for use by the SAS-RI. Both the SAS-JB and the SAS-RI enable the home run cable to have two levels of surge protection at the SAS-1 and in the cabinet, respectively.

The SAS-1 has a relay interface to the traffic controller, either as a card file input or as a shelf mount interface into a NEMA type controller, just like a typical loop detector relay card. The existing traffic controller handles cabinet processing and output. The traffic controller can be used in ITS applications to report traffic conditions, or as a controller at a signalized intersection.

The SAS-1 reports real-time data via an RS-422 or RS-232 interface, so the home run can be wired or wireless or via fiber. Several SAS-1 sensors can be connected on the same home run connection. The relay interface may be omitted in favor of a direction connection to the cabinet controller or communications option. The next few pages show these variations as well as implementations with various types of controllers and relay interfaces.

The wireless homerun option is shown on page 3-10.

Key

= NY DOT Supplied

= SmarTek Systems Item

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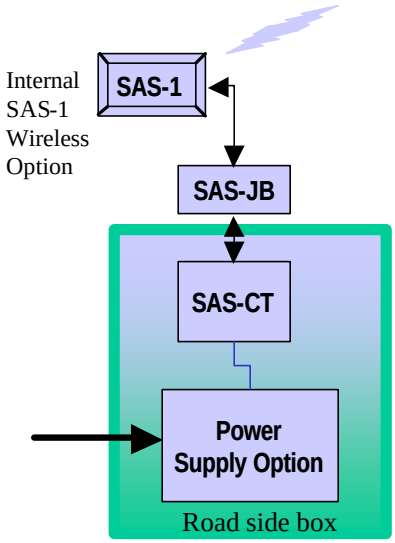
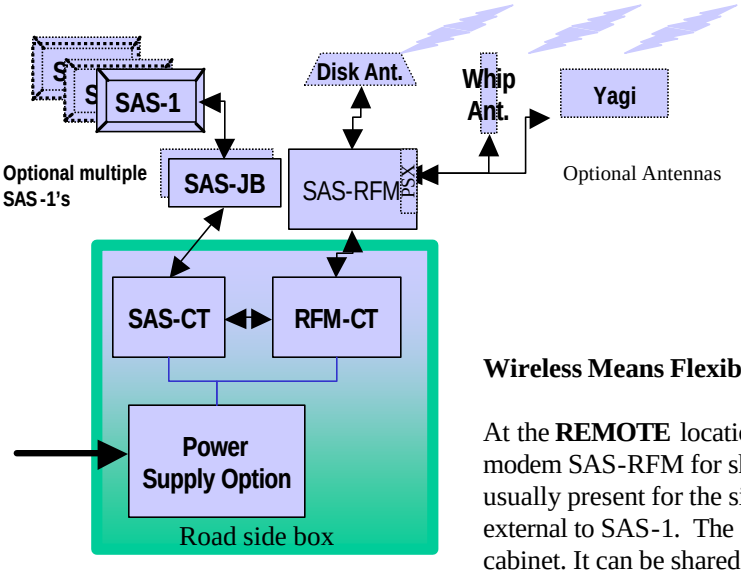
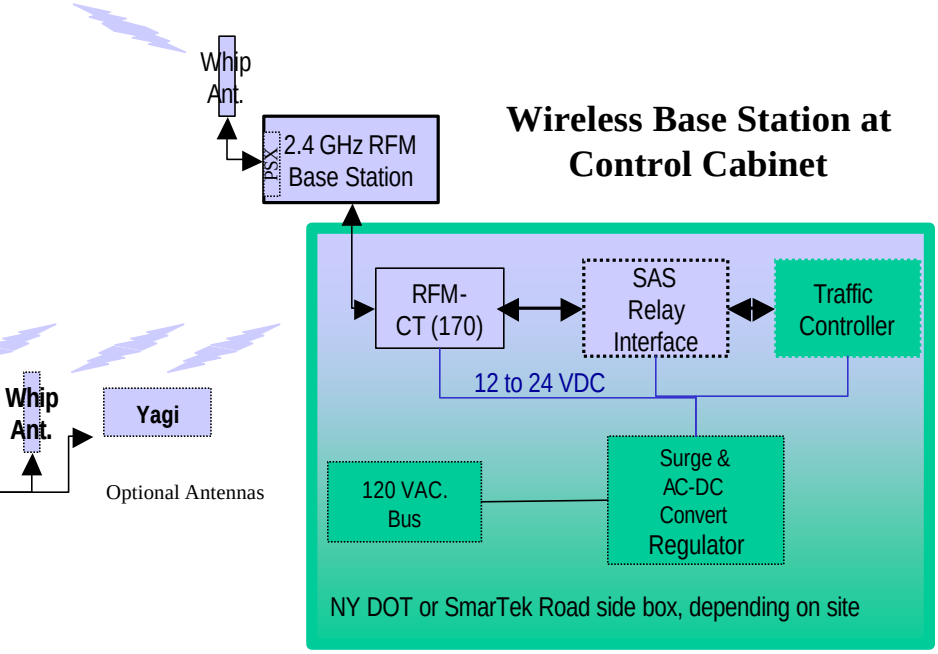
SAS-1 Wireless Home Run Options

Whether used as a stand alone sensor, or one of several at a particular location, much of the ease of installation of a non-intrusive sensor is magnified by using a wireless option to connect to a cabinet controller, regardless of the interface or ultimate communications connection beyond the cabinet.





Examples of Remote SAS-1 Sites Reporting to a Cabinet Controller



Wireless Base Station at Control Cabinet

Wireless Means Flexible

At the **REMOTE** locations, SAS-1 can be installed with an internal wireless modem SAS-RFM for short point-to-point connections, or because a cabinet is usually present for the site power supply, a co-located SAS-RFM modem external to SAS-1. The SAS-RFM can be internal or external to the site power cabinet. It can be shared by multiple SAS-1's at co-located at the site if they are all connected to a common SAS-CT. If a whip antenna or Yagi antenna is required, it is recommended that a SAS-RFM be located externally on the support structure near the antenna. In the case of a disk antenna, it is recommended that the SAS-RFM be located inside the power cabinet.

The **BASE STATION** is equally as flexible. Multiple remote sites can be connected to the same SAS-RFM base station. This allows several approaches to an intersection to be made wirelessly rather than pulling home runs to each sensor. It also allows several sensors which may be in the line of site of a cabinet controller location up and down road for an ITS application to report to one cabinet controller acting as a data concentrator, reducing the number of traffic controllers which have to be installed and maintained. The standard relay interface option is shown here, but it is not required. Base station SAS-RFM has serial connections which can connect directly to a cabinet controller or communications device.

Key

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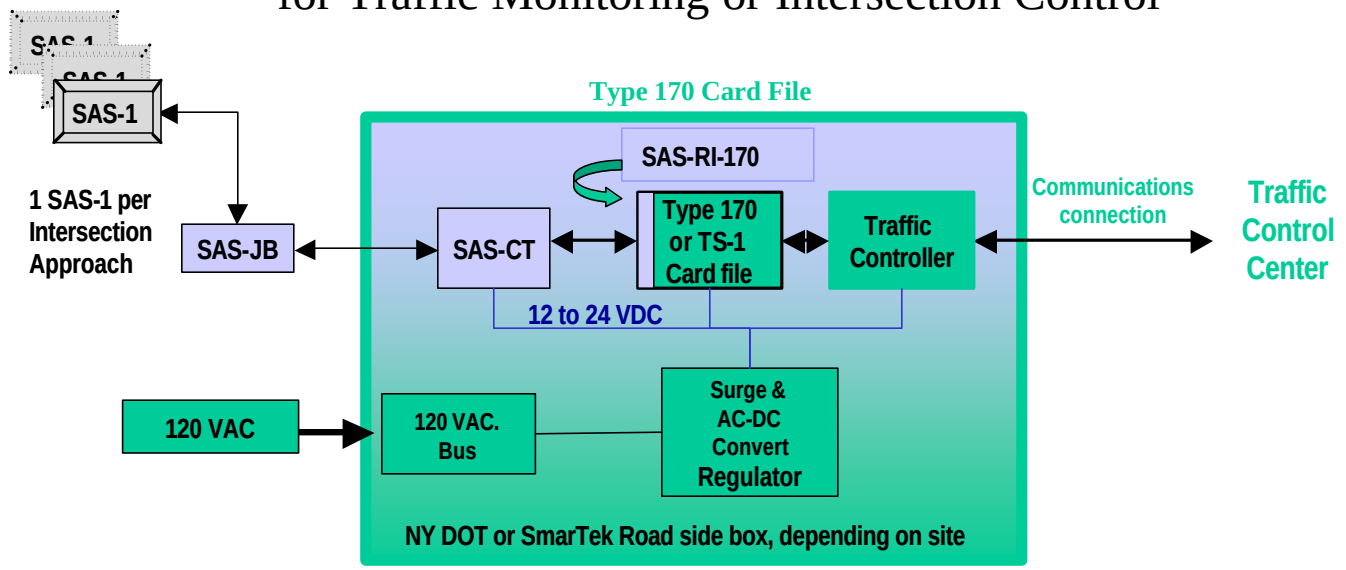
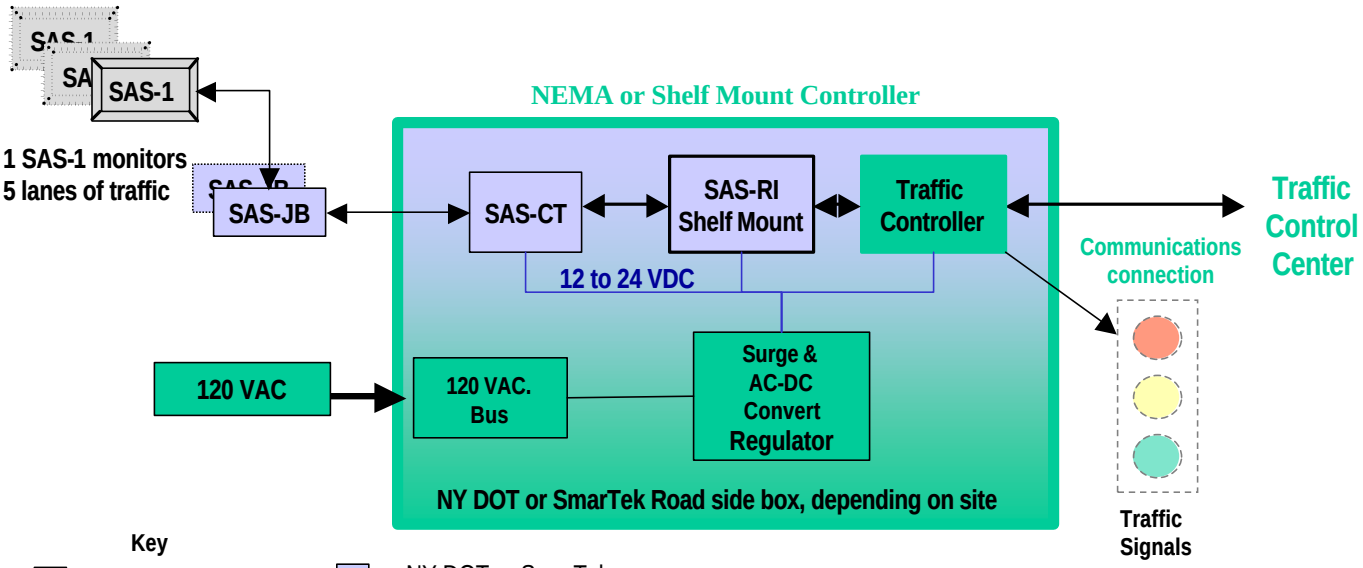
Configuration 1A -- SAS-1with Relay Interface

for Traffic Monitoring or Intersection Control



General description:

This is the general use site, where one or more SAS-1's are being used to replace traditional loops as inputs to the controller. In this case the home run is shown as hard wired, and each SAS-1 has a relay interface to the traffic controller. The variation is SAS-1 has both a card file input or a shelf mount interface into a NEMA type controller, just like a typical loop detector relay card. The traffic controller can be used in ITS applications to report traffic conditions, or as a controller at a signalized intersection. The SAS-1 is set up to provide a single or dual loop emulation in the ITS configuration, while it is used as a true presence detector in the configuration at traffic intersection stop lines.



Key

= NY DOT Supplied

= SmarTek Systems Item

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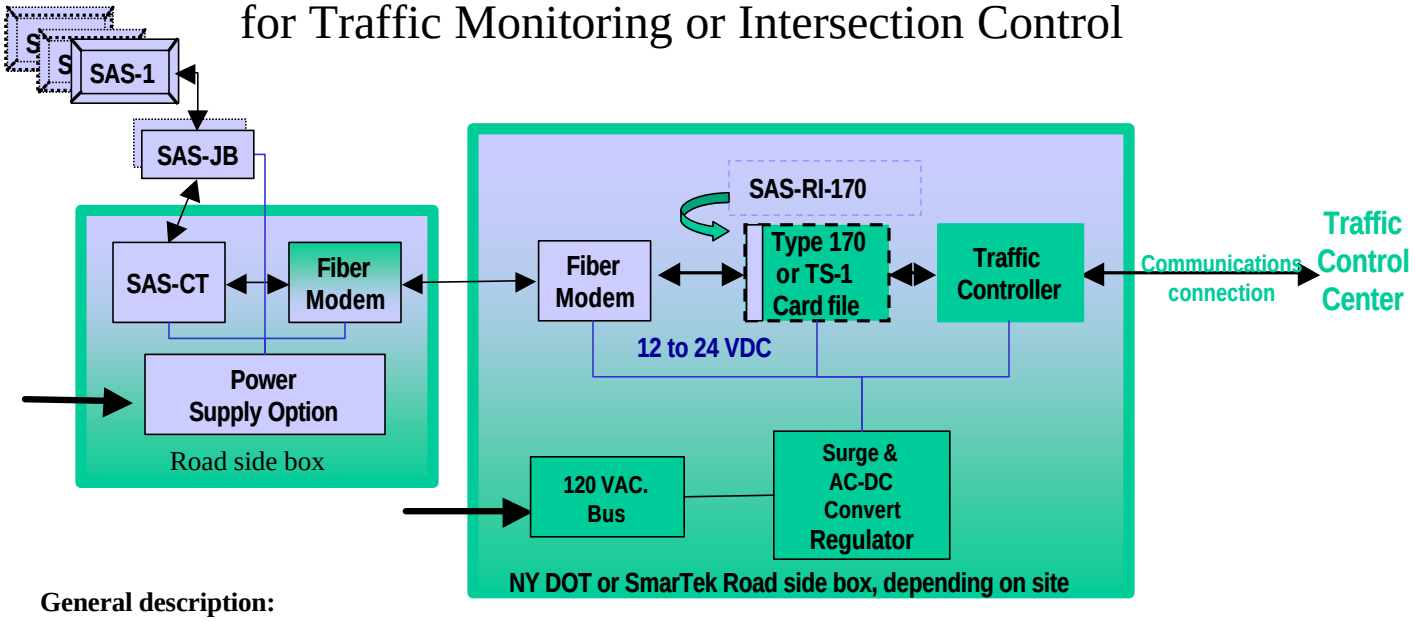
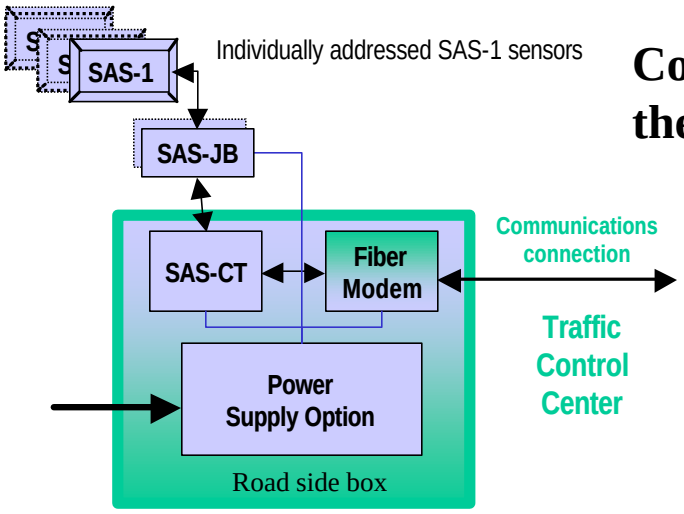
Configuration 1B -- SAS-1with Relay Interface
for Traffic Monitoring or Intersection Control



General description:

This is a variation on the ITS traffic monitoring site where the communication link between the SAS-1 sensor and the control cabinet is not a hard wire or wireless modem, but a fiber cable carrying data between remote sensors and the cabinet controller. Again, where the SAS-1 is being used to replace traditional loops as a traffic detector, a the SAS-RI is an option for providing the relay interface to the traffic controller, either as a card file input or as a shelf mount interface into a NEMA type controller. Up to 6 SAS-1 sensors can be connected via the same home run connection to their respective SAS-RI's in the 170 or TS1card file. If a programmable traffic controller is used, such as a Type 2070, the card file and relay interface can be bypassed and the output of the fiber modem can be connected directly to an RS-232 input of the 2070 for data transfer.



Configuration 1C -- Eliminate the Expensive Traffic Controller

Another variation on the ITS traffic monitoring site does away entirely with the cabinet controller and large cabinet. The SAS-1 reports either asynchronously or is polled for traffic information directly by the traffic control center, in this case via fiber modem, reducing the size and power requirements of the traffic monitoring site.

Key

= NY DOT Supplied
= SmarTek Systems Item
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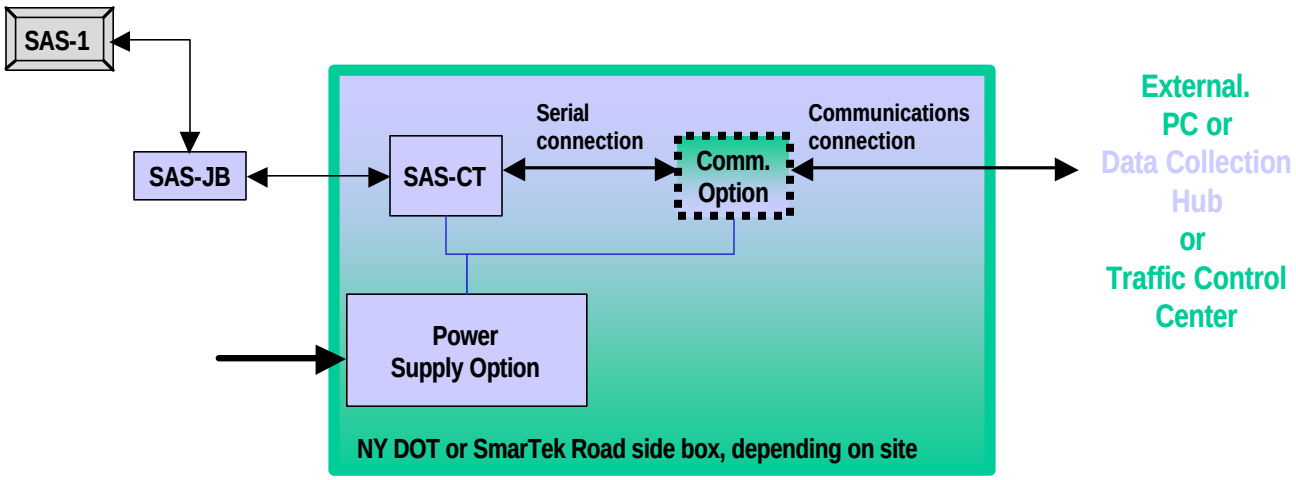
Configuration 2 -- SAS-1 Data Site



General description:

At a data collection site, either permanent or portable, the SmarTek Systems SAS-1 detects traffic, calculates Volume, Occupancy, & Speed. per lane, and stores an archive in user selectable intervals of 5, 10, 15. 20, 30 or 60 minutes. The SAS-1 may be either polled by an external data collection device or hub or reports on user-selectable (1-220sec) intervals for real time traffic operations via several communications options. The site can be powered any means, but is usually either by AC generator or a DC based solar system.

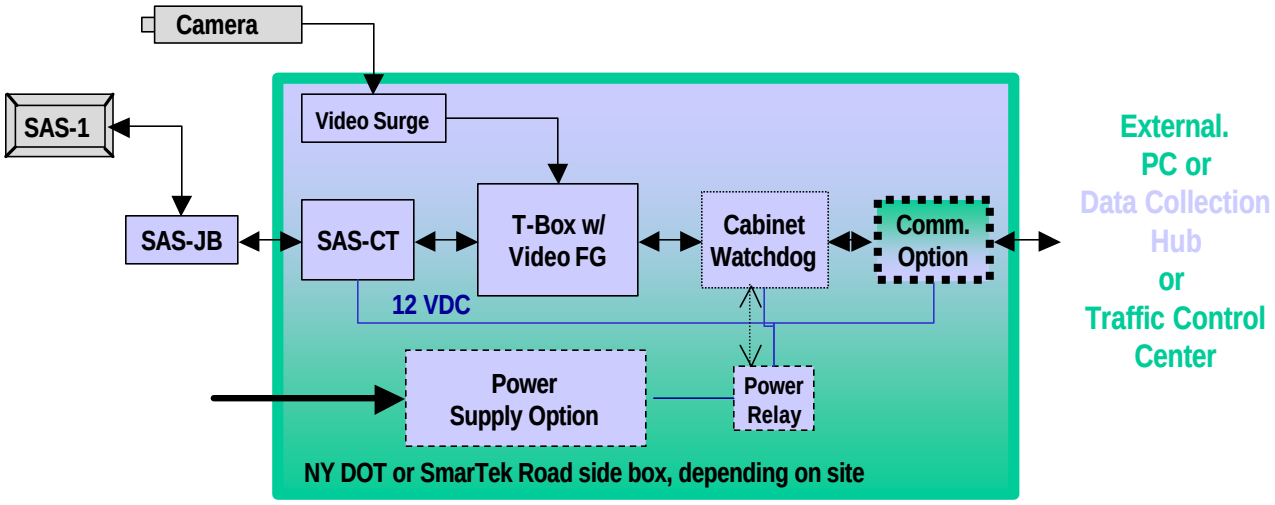
In this case the SAS-1 is a smart sensor providing data input, site data processing and storage, and the required information output via the selected communications option.

The method of data collection is optional and defined by the user of the site. It is normally not in real time. The serial output of the SAS-CT enables any of the communications options listed earlier or by direct extraction to by a laptop in the field.

Key

= NY DOT Supplied
= SmarTek Systems Item
= NY DOT or SmarTek Supplied, depending on site

Configuration 3 -- SAS-1 & Camera Inputs to T-Box
for Traffic Information with JPEG Images



General description:

If additional information is required from a data collection site, or the site is to serve as a real-time operations site, traffic images or other sensor information may be added to the information stream. The simplest of these is the addition of a camera at the site, capturing a series of JPEG images which are then transmitted along with the traffic data back to the control center via the selected communications method.

To accomplish this, a SmarTek Systems SAS-1 Traffic Detector connects to a T-Box with a Framegrabber option. As before, the SAS-1 provides Volume, Occupancy, & Speed. per lane. T-Box captures sensor data & video and sends data via Communications Option every 30 to 60 seconds. The T-Box may also be set up to archive traffic data at selectable intervals.

Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet information such as battery and cell voltages and door (open/closed) position to data stream. An optional cabinet Power Relay Module is available to reset cabinet equipment by temporarily interrupting and restoring the battery power to the equipment. The relay is usually controlled by the cabinet watch dog timer.

Several variations on this configuration follow, showing optional sensor inputs, multiple camera configurations, etc.

Key
= NY DOT Supplied
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= NY DOT or SmarTek Supplied, depending on site

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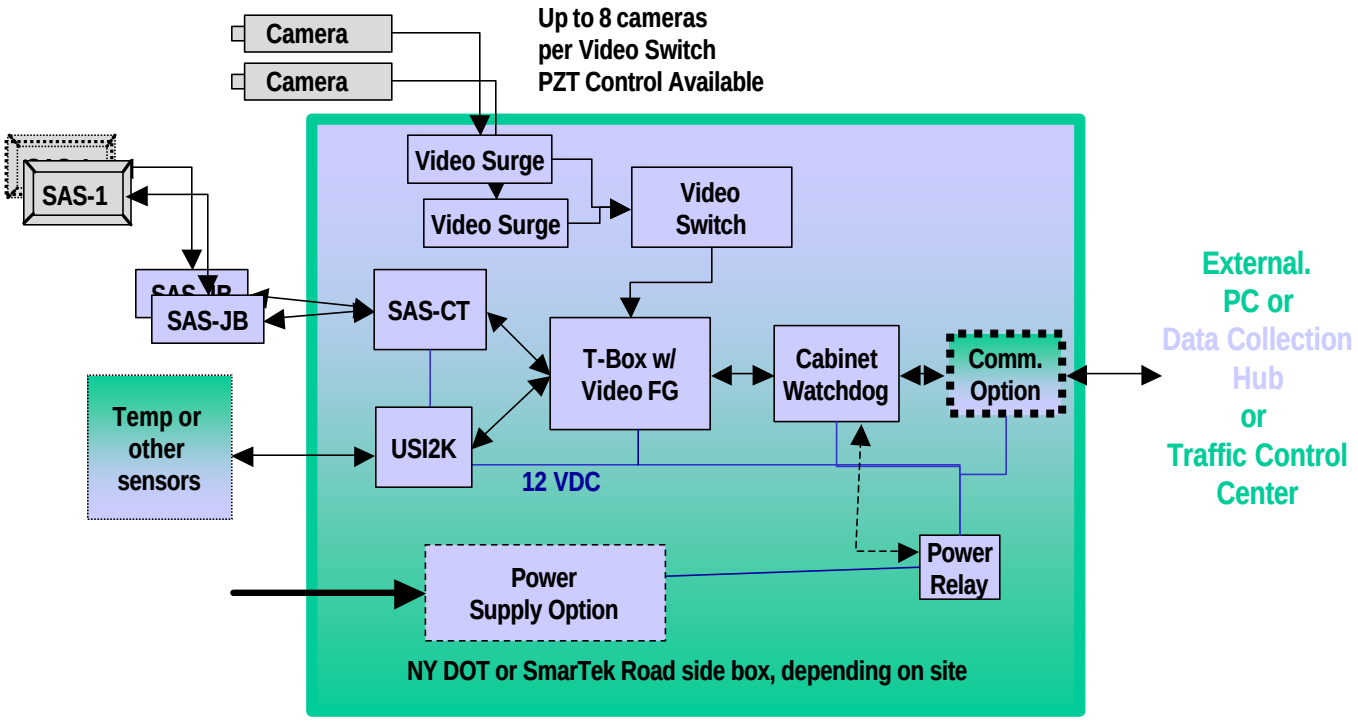
Configuration 4 -- Multiple SAS-1 and Camera Inputs

Traffic Data with JPEG Images



General description:

As seen in previous examples, all of our remote processing architecture is fully modular and scaleable. Adding additional types of sensors as inputs to provide temperature and weather information are options that are completely available.

In this example, a SAS-1 Traffic Detector is provided for two directions of traffic via hardwire. Each SAS-1 provides Volume, Occupancy, & Speed. per lane. The SAS-CT connects to a T-Box with a Framegrabber option. T-Box captures sensor(s) data & video, processes traffic or weather alerts and sends the site information via Communications Option every 30 to 60 seconds. T-Box may also archive traffic data at a selectable intervals for output via separate data requests.

Other data sensor inputs via USI2K as required with data archived in T-Box as well. These sensors include digital temperature probes, fog detectors or full weather systems. The only requirement is that the device have a serial protocol that is made available to us such that a USI2K can be programmed to provide the interface this sensor.

Additional cameras are currently added via the use of video switch. The next generation T-Box, available in early 2003, will have up to 6 video inputs without having to use a video switch.

As shown previously, the Cabinet WatchDog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment by cycling the Power Relay Module.

Key

= NY DOT Supplied
= SmarTek Systems Item
= NY DOT or SmarTek Supplied, depending on site

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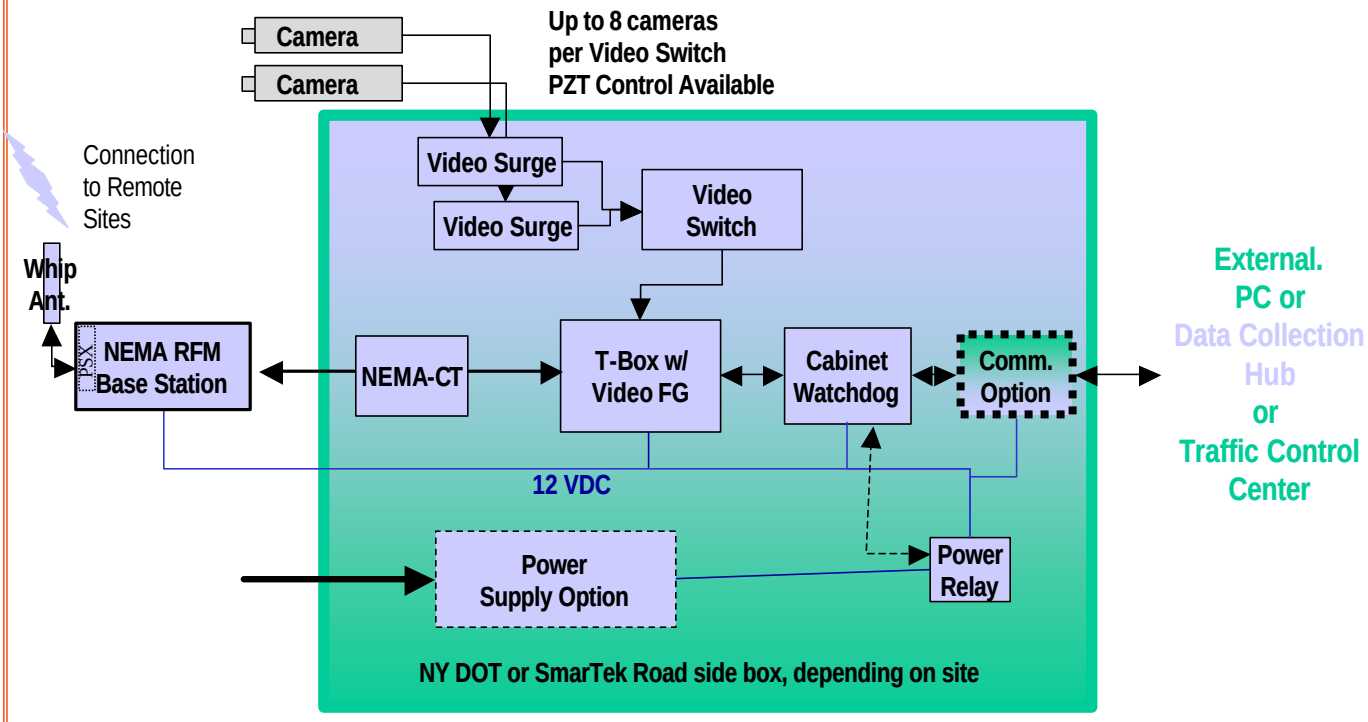
Configuration 4A-- Data Collection Hub or Base Station with Camera Inputs

for Traffic Information with JPEG Images



General description:

Our remote processing architecture is fully modular and scaleable. For example, a data hub site is used to collect data from stand-alone SAS-1 to any of the other sites shown in other configurations. This data hub also may be used as a data collection and consolidation point by bringing data and images from several remote sites, serving as the main communications connection to the traffic control center.

As shown here, the remote sites input their data via a 2.4 GHz RFM. The SmarTek Systems 2.4 GHz RFM in a NEMA enclosure connects to a T-Box with a Framegrabber option. The T-Box collects remote site data sent and stores it in archive or data queue for upload into a central operations server. The number of sites attached to a base unit is solely limited to data transfer rates and revisit times from remote sites and the upper limit of the T-Box serial port or Ethernet connection.

Other local data sensor inputs from SAS-1 and USI2K as shown in **Configuration 4** are available, but are not shown here. Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment by cycling the Power Relay Module.

Key

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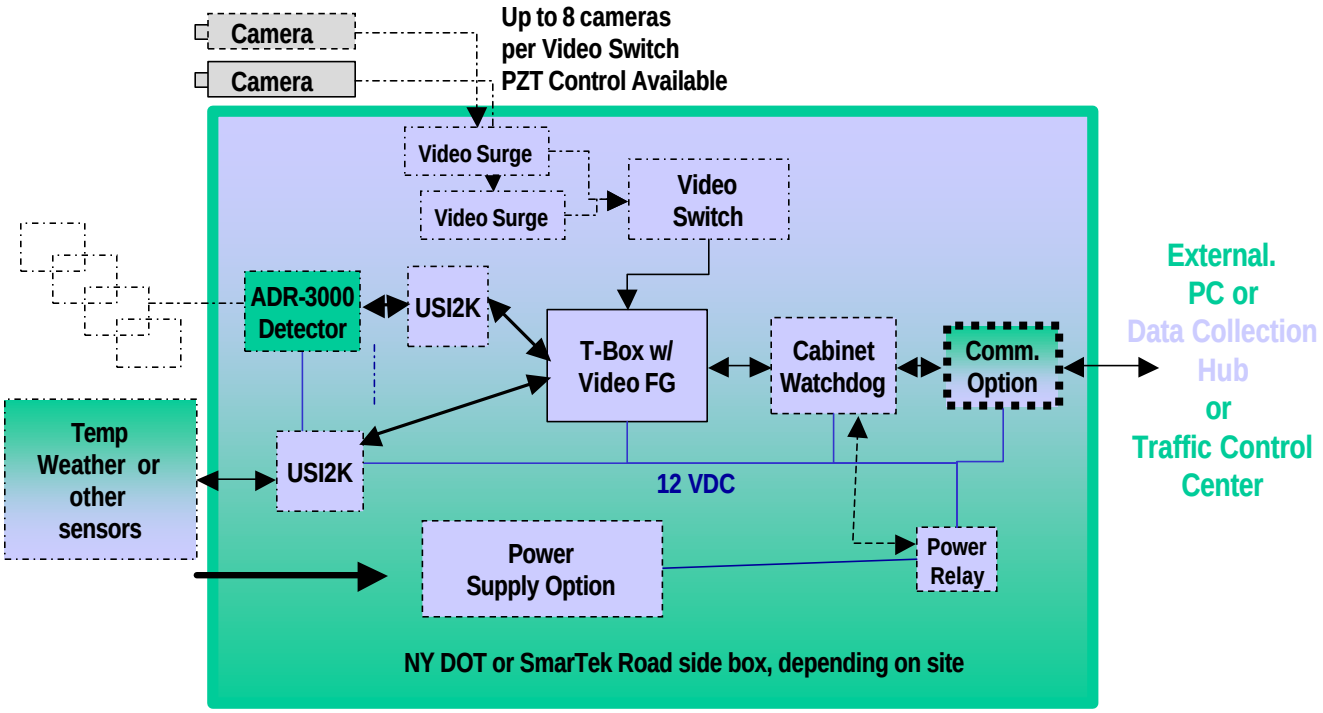
Configuration 4B– T-Box Based Data Collection

Site without SAS-1 Inputs



General description:

A site's traffic sensors do not have to be the SAS-1. Existing loops can be integrated inputs to the traffic data stream as well, utilizing several options. These options will be shown over the next few pages.

This is general data collection site with one or more video inputs. In addition to the video imagery, the T-Box collects data from a variety sensors or site equipment interfaces and stores it in archive or data queue for upload into a central operations server. Existing loops are utilized by using a Peek ADR-3000 connected to the USI2K interface to provide traffic data. T-Box processes the resulting data stream from the USI2K just like SAS-1 data, providing traffic alerts, images and data storage. This configuration has the additional capability to be queried by Central Data collection software polling the site via modem. When the T-Box sees the Central data request, it adopts a "transparent" mode, allowing the Central Data Collection program to query the ADR-3000 without interruption.

Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment by cycling the Power Relay Module.

Key

= NY DOT Supplied

= SmarTek Systems Item

= NY DOT or SmarTek Supplied, depending on site

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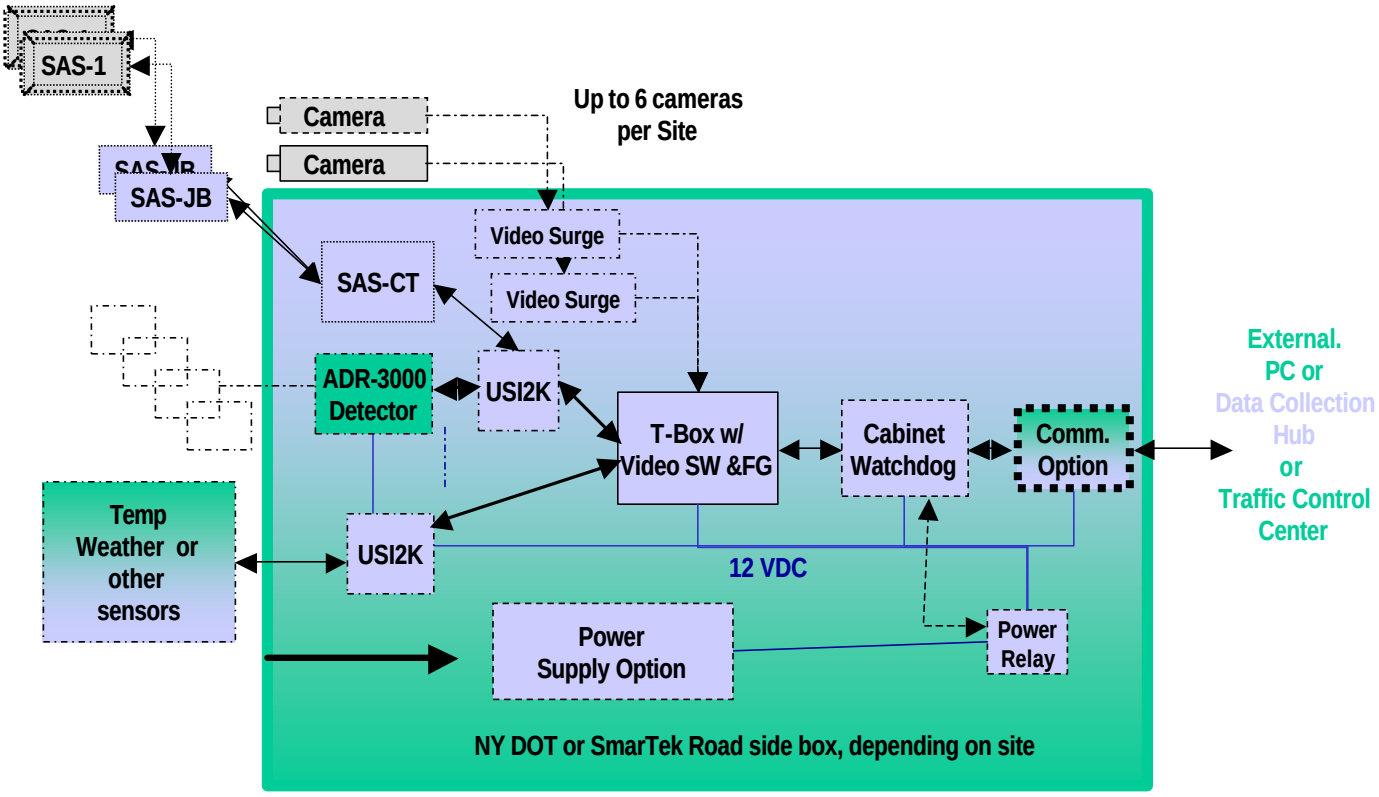
Configuration 4C– T-Box Based Data Collection

T-Box with integrated Video Switch and Frame Grabber



General description:

A site's traffic sensors, with several options outlined as before, are integrated inputs to the traffic data stream, utilizing a newer version of T-Box which incorporates the video switch and frame grabber previously sold separately.

This is a general data collection site with one or more video inputs. In addition to the video imagery, the T-Box collects data from a variety sensors or site equipment interfaces and stores it in archive or data queue for upload into a central operations server. Existing loops are utilized by using a Peek ADR-3000 connected to the USI2K interface to provide traffic data. SAS-1 sensors can also provide data if loops are not in place. T-Box processes the resulting data stream from the USI2K, providing traffic alerts, images and data storage. This configuration has the additional capability to be queried by Central Data collection software polling the site via modem. When the T-Box sees the Central data request, it adopts a "transparent" mode, allowing the Central Data Collection program to query the ADR-3000 without interruption.

Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment by cycling the Power Relay Module.

Key

= NY DOT Supplied
= SmarTek Systems Item
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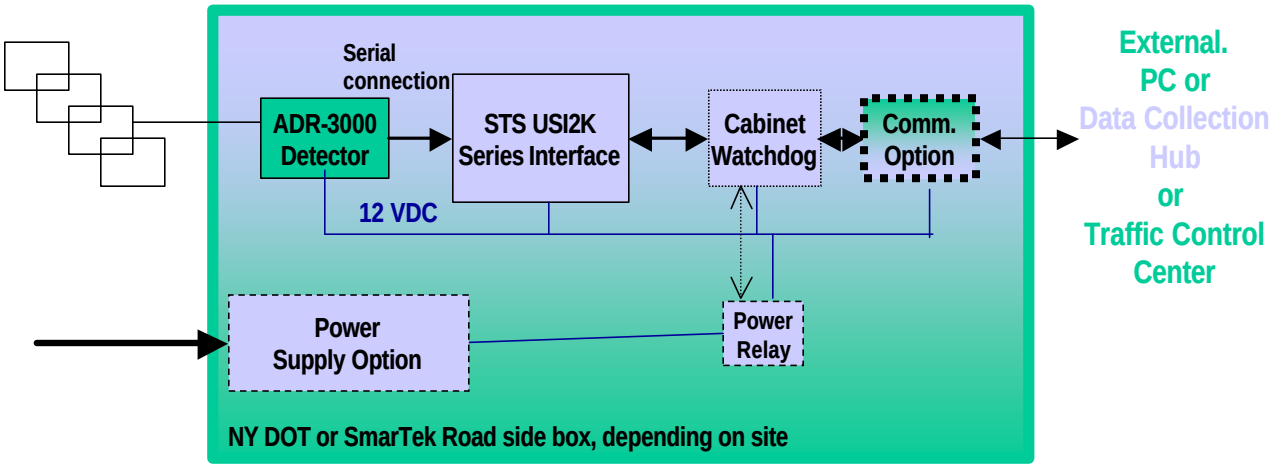
Configuration 5 -- NY DoT site with existing loops
and No Video, Option 1



General description:

If an existing loop count site is to be revitalized as a data only site without the addition of cameras, a couple of options are available which cost less than using a full T-Box at the site. The USI2K as an interface to an ADR-3000 as before, but to have the USI2K communicate directly through the systems communications interface to a central data collector or traffic control center. The USI2K makes the data site look exactly like the site is an existing SAS-1 site to the central software.

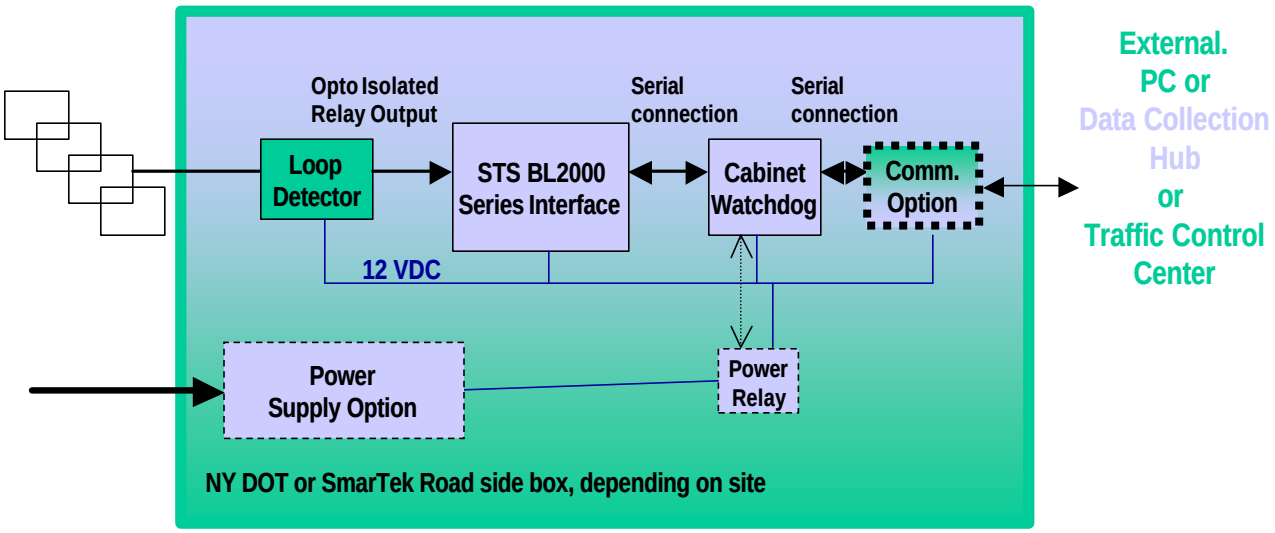
Specifically, existing loops in the road are connected to a Peek ADR-3000 providing a real-time event data stream to the SmarTek Systems USI2K series interface. The USI2K calculates Volume, Occupancy, & Speed per lane, stores an archive at a selectable intervals and sends real time data via Communications Option modem every 20 to 60 seconds.

Optional Cabinet WatchDog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment via cycle of Power Relay Module.

Key

= NY DOT Supplied
= SmarTek Systems Item
= NY DOT or SmarTek Supplied, depending on site

Configuration 6 -- NY DoT site with existing loops
and No Video, Option 2



General description:

Here again, an existing count site is to be revitalized without the addition of cameras as a data only site. This second option allows the use of existing loop detectors, either rack or shelf mounted for traffic detection, but utilizes at STS BL2000 programmed to turn the loop detector relay output into traffic data like a Type 170, 2070 or NEMA controller would, then communicate directly through the systems communications interface to a central data collector or traffic control center. The BL2000 makes the data site look exactly like the site is an existing SAS-1 site to the central software. The BL2000 is very small in comparison to the larger controllers listed above (about the size of a hand-held calculator), yet just as powerful while operating on much less power. Nonetheless, due to the unknown nature of the power requirements of the existing loop detectors, it is recommended that the power supply option be an AC source rather than solar power.

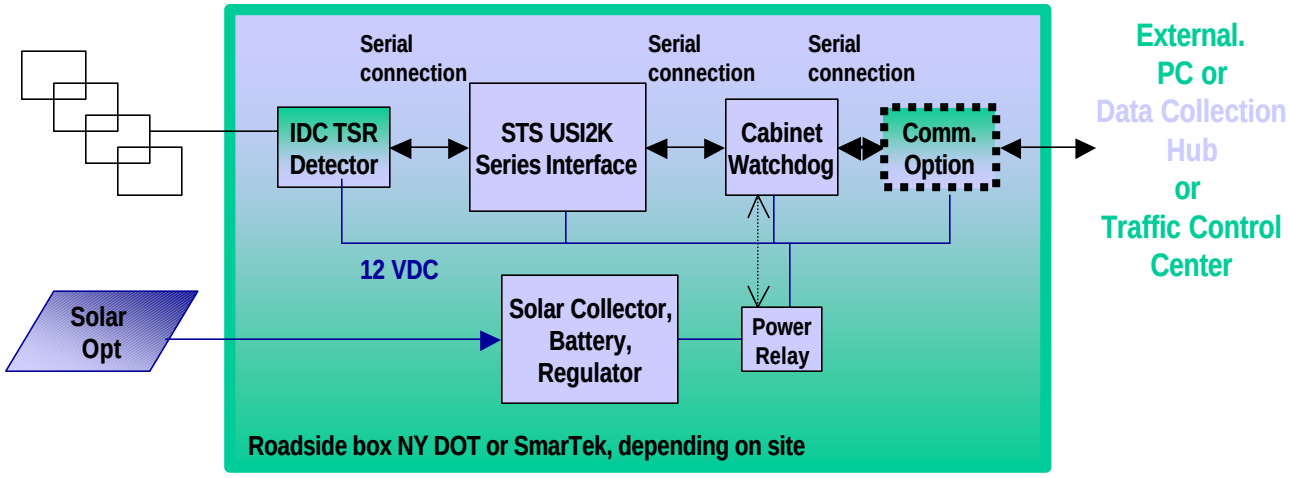
Similar to the previous option, existing loops in the road are used, but they are connected to a loop detector with an opto-isolated output provide contact closures to the SmarTek Systems BL2000 series interface instead of an ADR-3000. The BL2000 calculates Volume, Occupancy, & Speed per lane, stores an archive at selected intervals and sends data via CDPD modem every 20 to 60 seconds. Other communications options maybe used, but they may not be as cost effective.

Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment by cycling the Power Relay Module.

Key

= NY DOT Supplied
= SmarTek Systems Item
= NY DOT or SmarTek Supplied, depending on site

Configuration 7 -- NY DoT site with existing loops, Option 3



General description:

A third option to use existing loops as inputs to an IDC TSR providing a real-time event data stream to the SmarTek Systems USI2K series interface. The USI2K processes this information and calculates Volume, Occupancy, & Speed per lane, stores an archive selected intervals. Traffic data is output via Communication Option modem every 20 to 60 seconds.

This option is shown using a solar option to illustrate the low power budget required for this type of site. AC powered sites can be realized using this configuration as well.

Cabinet watchdog monitors cabinet voltages and communications stream, adding cabinet info to data stream. If watch dog is not fed, it resets cabinet equipment via cycle of Power Relay Module.

It is assumed that a statewide contract is in place for PAT America or IDC to provide the counter directly to the state.

Key

= NY DOT Supplied
= SmarTek Systems Item
= NY DOT or SmarTek Supplied, depending on site