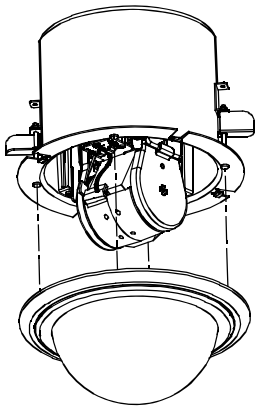
SpeedDome® Optima LT Indoor Camera Dome

RASEL Series

Installation and Service Guide



The SpeedDome Optima LT indoor camera dome mounts either to a hard ceiling or to a 2x2 tile ceiling using a mounting plate (instructions for the plate are supplied separately).

CAUTION: Save the box and packing materials. These materials are required should you need to ship the dome to a repair center.

Note: The dome accepts either cable or conduit. If running cable through a plenum ceiling, either plenum-rated cable or flexible conduit is required.

Contents

Warnings

Please review the following warnings before you install or service the camera dome.

ALWAYS USE:

- Proper safety equipment for the location and type of installation.
- Proper lift equipment to reach the installation.
- Safety features of the lift equipment.

BE SURE:

- Electrical power is not connected to the dome when connecting wires. Camera will move when power is applied.
- Electrical power is not connected to nearby fixtures that you might touch during installation.

DO NOT install this dome in hazardous areas where highly combustible or explosive products are stored or used.

This dome runs on 24Vac. DO NOT connect line voltage to this dome.

North America power requirements: In North America, this device is intended to be supplied from a Class 2 power supply.

This installation should be made by a qualified service person and should conform to all local codes.

EU power requirements: This product runs on 24Vac. In the EU, it is intended to be powered from a Limited Power Source. A limited power source is a certified source of SELV, and if inherently limited, with 8 amps maximum output current, and a maximum of 100VA available; or if not inherently limited, fused with a maximum value of 3.3 Amps, meeting section 2.11 of IEC950, and a maximum of 250VA available. The power supply can be obtained through Sensormatic or through another source where the provider can furnish the verification. This is required to assure electrical safety in the product.

Stromanforderungen in der EU: Dieses Produkt wird mit 24 V Wechselstrom betrieben. In der EU ist es für den Betrieb durch eine begrenzte Stromquelle vorgesehen. Eine begrenzte Stromquelle ist eine zertifizierte SELV-Quelle (Schutzkleinspannung), bei inhärenter Begrenzung mit einem maximalen Ausgangsstrom von 8 A und 100 VA maximaler Verfügbarkeit, bei nicht inhärenter Begrenzung mit einer maximalen Sicherung von 3,3 A gemäß Abschnitt 2.11 der IEC950 und 250 VA maximaler Verfügbarkeit. Das Netzteil kann über Sensormatic oder eine andere Quelle bezogen werden, wobei der Anbieter den Nachweis der Konformität bereitstellen sollte. Dies ist zur Gewährleistung der elektrischen Sicherheit des Produktes erforderlich.

Before You Begin

To ensure a smooth and successful installation, observe the following requirements.

General Requirements

- Have electrical work comply with latest national electrical code, national fire code, and all applicable local codes and ordinances.
- Coordinate work with other trades to avoid interference.
- Verify existing site conditions and coordinate with the owner's representative and appropriate utilities as required.
- Obtain copies of all related plans, specifications, shop drawings and addenda to schedule and coordinate related work.
- Thoroughly review the project to ensure that all work meets or exceeds the above requirements. Bring alleged discrepancies to the attention of the CCTV Project Coordinator.

Mounting Requirements

Mounting space: Ensure there is the following space above the ceiling to accommodate the dome.

Height above ceiling: 170mm (6.7in)

Diameter: 192mm (7.5in)

Structural members: Verify that ceiling members can support the camera dome and mounting structure, if used.

Weight: 2.5kg (5.5 lbs)

Cable Requirements

Data cables: The following table shows cable requirements for SensorNet, RS-422 and Manchester networks. For more information about communication protocols and cable networks, see *Communication Protocols and Cable Networks*, 8000-2573-19.

Data cable requirements

	SensorNet	RS-422 Simplex	Manchester
Cable type	1 unshielded, twisted pair*	1 shielded, twisted pair* **	1 shielded twisted pair***
Wire gauge	22 AWG	22AWG	18 AWG
Connection	Non-polarized	Polarized	Polarized
Max. devices per cable run	32	10	3

* Power, data, and video cables can be ordered separately or within a composite cable that can be ordered in various lengths. Plenum-rated cables must be used in indoor ceilings used for environmental air return (called "other air space" in the National Electrical Code). Order parts through your distribution network.

Note: If you order cable from an outside source, wire colors may be different.

** The RS-422 Simplex connection only uses a single twisted pair allowing the dome to receive only. RS-422 transmit from the dome is not supported.

*** Belden 88760 (plenum), or Belden 8760 cable (non-plenum) cable is recommended. Plenum-rated cables must be used in indoor ceilings used for environmental air return (called "other air space" in the National Electrical Code). Order cable directly from Belden by calling 1-800-235-3361.

Plenum ceilings: Cable must be rated for plenum or routed through flexible conduit. A cover plate for the dome accepts ½" conduit.

WARNING! Do not run cables adjacent to or in the same conduit as line voltage mains power.

Power cables. Make power cable lengths as short as possible to minimize the affects of low line voltages and outdoor cold temperature performance. Maximum cable length between a Class 2 LPS (low voltage) ac source, such as a J-box, and the dome depends on the ac line voltage. See the tables below for maximum cable lengths based on the worst-case low line voltages.

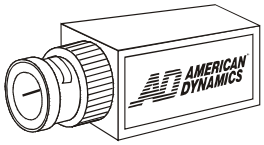
The line voltage must not go below the voltage shown for the dome to be able to power up and operate at the corresponding distances shown. Typically cable distances are used that provide a 15% margin between nominal and low line conditions. For example, if the nominal voltage measures 120Vac, restrict the cable length to the distance for .85 x 120 or approximately 100Vac.

Power cable requirements—Indoor Dome

Table 1 shows the maximum cable distance for several worst-case low line voltages between various indoor power sources and the indoor SpeedDome Optima. These distances are for Sensormatic composite cables, which use 18 AWG ac power wires.

This table applies to domes produced after October of 2001; distances are much less for earlier domes.

Twisted Pair Adapter



The ADACTP01BNC Twisted Pair Adapter (supplied) can be used to transmit video or video with up-the-coax (UTC) dome control signals over unshielded twisted pair (UTP) cables, point-to-point, up to 300m (1000ft).

The adapter mounts directly to the video source or receiver without additional cabling and uses Category 2-6 twisted pair wires to transmit the video and dome control signals. The adapter does not require power.

One adapter is supplied. If used, another adapter must be ordered to for the connection at the other end of the cable. The figure below shows twisted pair cable connections. See installation guide 8200-0298-01 for details.

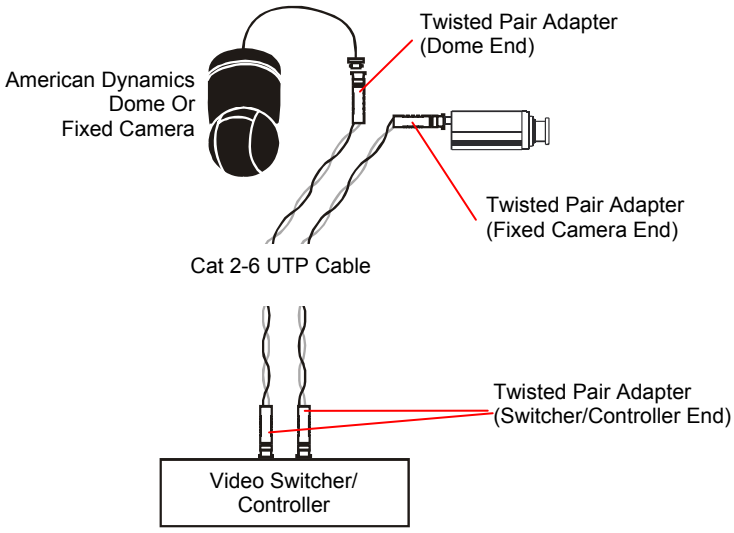


Table 1. Maximum cable length and worst-case low line voltages

Indoor Dome AC Power Source	Worst-Case Low Line V	Meters (Feet)
28 VA Transformer 5604-0006-01	117	130 (425)
	100	80 (250)
	90	60 (200)
50 VA Transformer 5604-0044-01	117	160 (525)
	100	100 (325)
	90	60 (200)
1-position SensorNet or RS-422 J-Box RJ1SNUD, RS856UD	117	160 (525)
	100	100 (325)
	90	80 (250)
1-position SensorNet or RS-422 J-Box RJ1SNUD-1, RS856UD-1	240	160 (525)
	200	100 (325)
	180	80 (250)
6-position SensorNet Indoor J-Box RJ6SN	117	210 (675)
	100	130 (425)
	90	80 (250)
	240	210 (675)
	200	130 (425)
	180	80 (250)
10-position RS-422 Indoor 120V/60Hz J-Box RJ860AP	117	200 (625)
	100	130 (425)
	90	100 (325)
10-position RS-422 Indoor 240V/50Hz J-Box RJ860AP1	240	225 (750)
	200	160 (525)
	180	125 (375)
Universal Transformer 0300-0914-01	117	130 (425)
	100	100 (325)
	90	60 (200)
Universal Transformer 0300-0914-03	240	160 (525)
	200	100 (325)
	180	80 (250)

SensorNet Line Termination

SensorNet communication protocols require line termination. Accessing slide switch S1 through the hole in the top of the dome, terminate the dome furthest from the video controller or junction box by moving the switch to the “terminated” position. All other domes along the line must be unterminated.

Manchester and RS-422 protocols do not require line termination.

Setting the Camera Address

Accessed through the hole in the top of the dome are rotary switches SW1, SW2, and SW3 are used to set the dome address.

Protocol address ranges are as follows:

SensorNet	1-255
Manchester	1-64
RS-422	1-99

For example, for address 107, set SW3 to 1, SW2 to 0 (black dot), and SW1 to 7.

Compatibility with the VM96 Controller

If using a VM96 controller, the controller must be Version 5.2 or higher.

Power-Up Routine

After power is connected to the dome, the dome performs a homing routine. During the homing process, the camera will pan and then either:

- Go to the start point of the “apple peel” pattern, or
- If powered up once before, to the last position in memory.

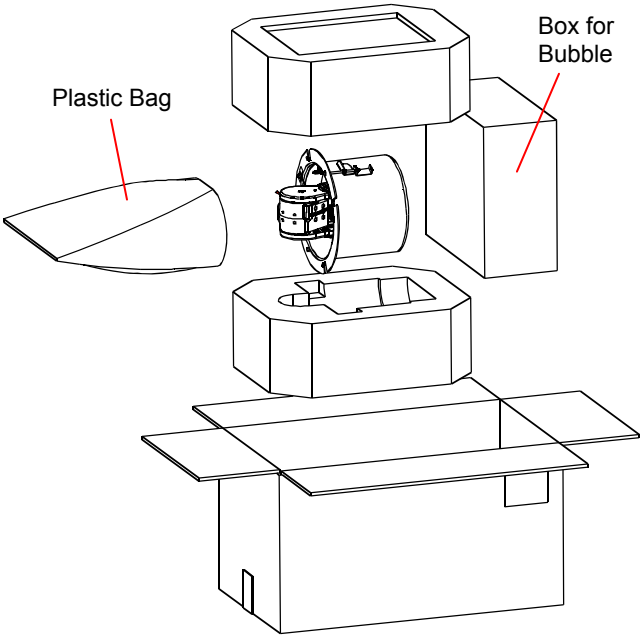
Once the camera stops, the camera is online and is ready to be controlled.

Synchronizing Domes

To prevent picture rolling when switching from camera to camera, all domes can be synchronized to the ac source. A V-phase adjustment at the control console enables the dome to sync to any line phase.

Save Packaging Material

Should the camera dome need to be sent to a repair center, use the packaging that the dome was shipped in.



Installation

Parts required

Note: For installation to a tile ceiling, also order the UL-approved RH2x2 Metal Plate Mounting Kit.

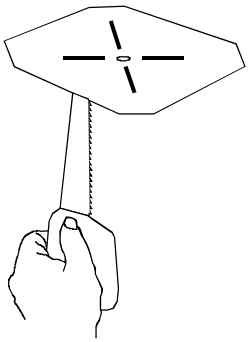
Install Kit 0352-0020-01

Connector, 3-position (power)	1	2109-0254-02
Connector, 2-position (data)	1	2109-0756-01
Wire, hanging	3.6m (12ft)	2898-0007-01
Card, quick connect	1	2402-2055-02
Template, cutout, hard mount	1	2402-2054-01

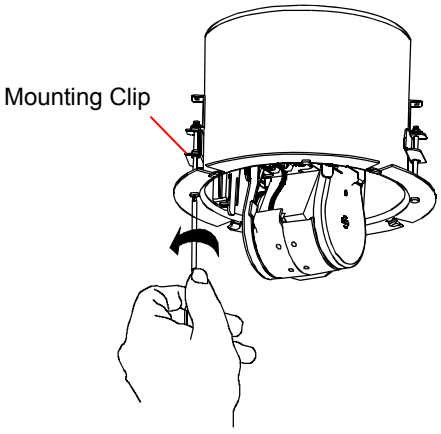
Procedure

Use the following steps when attaching the dome to a hard ceiling.

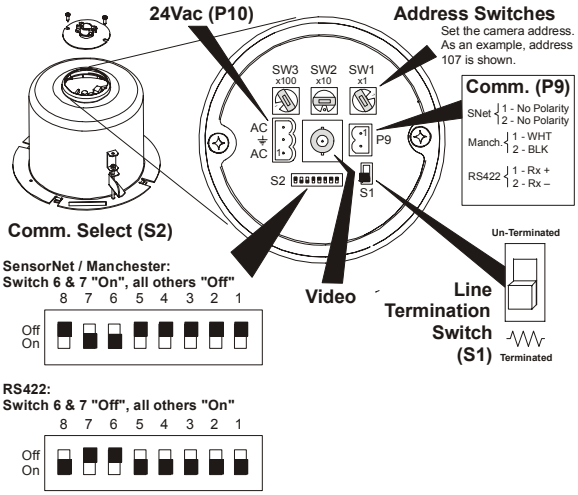
1. Using template supplied, cut a hole in the ceiling. Run power and data cables and the video cable to the hole.



2. For ease of installation, adjust the two “swing out” mounting clips for ceiling thickness.



3. To expose connectors and settings at the top of the dome, remove the cover plate by removing one screw and loosening the other.



4. Set address switches SW1, SW2, and SW3 for the address (for example: 001–016 for VM16, 001–096 for VM96).

5. If daisy-chaining domes, the dome furthest from the video controller requires that termination switch S1 remain in the “terminated” position (resistor symbol). All other domes along the chain must be set to “un-terminated”.

6. Inside the opening, check communications DIP switch S2 for the correct settings.

   - For SensorNet and Manchester, ensure switches 6 and 7 are “On”. Other switches should be “Off”.
   - For RS-422, ensure that switches 6 and 7 are “Off”. Other switches should be “On”.

7. Determine if conduit or cables will be used. If using conduit, remove the Romex clamp and use 1/2in. flexible conduit and appropriate fittings. If using cables, they must be plenum-rated if running through a ceiling plenum and they must be secured using the cover plate and Romex clamp.

8. Leaving .6m (2ft) of service loop so the dome can be dropped from the ceiling for servicing, run the cable through the cover plate and Romex clamp, if used.

9. Remove 2.5-3.8cm (1–1.5in) of jacket from the cable end and install power and data connectors supplied.

10. Plug connectors to the board according to the figure above.

11. If using conduit, attach it to the cover plate using the appropriate fittings and then reattach the cover plate. If using cable, reattach the cover plate to the dome using two screws and then tighten the Romex clamp against the cable (required to maintain the Plenum rating).

12. Attach a BNC connector to the video cable (if not using the Twisted Pair Adapter). Also attach the orange 3-pin power plug to connector P10 and the gray 2-pin data communications plug to connector P9. Wire colors in diagram refer to cables supplied by Sensormatic.

    Note: Use a small screwdriver to tighten the connector screws. DO NOT over tighten the connectors!

13. Plug video (or Twisted Pair Adapter), power, and data communications cables into their mating connectors in the top of the dome housing.

    WARNING! Ensure power is off at the source when connecting cables. Otherwise, the dome will operate during installation.

14. Reattach the cover plate to the dome housing.

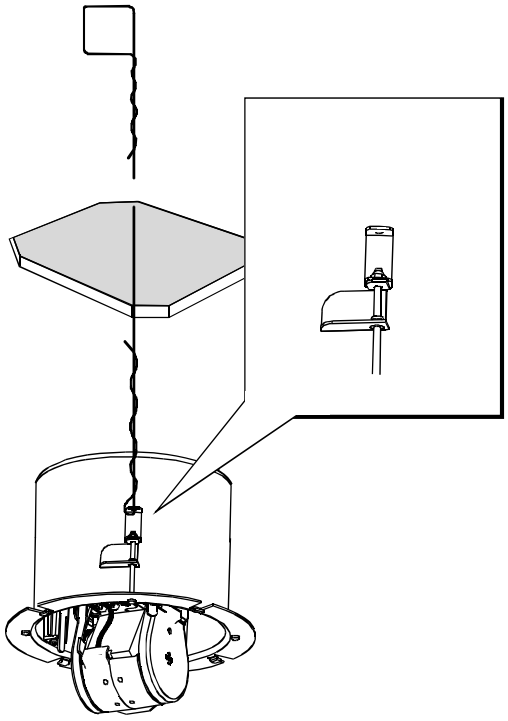
15. Using safety wire, attach the dome to a strong structural ceiling member as follows:

    a. Find a strong structural member capable of supporting the dome. Wrap one end of the wire around this member and twist the wire around itself four times to secure.

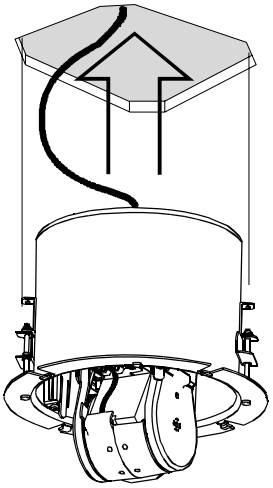
    b. Run the other end of the wire through one of the holes above the swing out tabs. Twist the wire around itself four times to secure.

    c. Ensure the wire is taut!

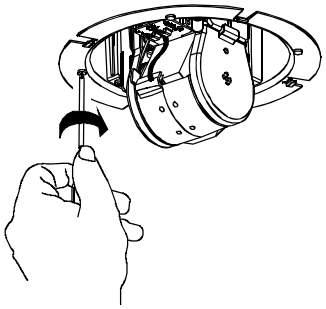
    WARNING! Keep the wire as taut as possible. Do not secure to any component of a fire control system.



16. Insert the dome into the hole in the ceiling.



17. Turn each of the two locking screws clockwise to fully extend the “swing out” mounting clips and to seat them tightly against the top surface of the ceiling.



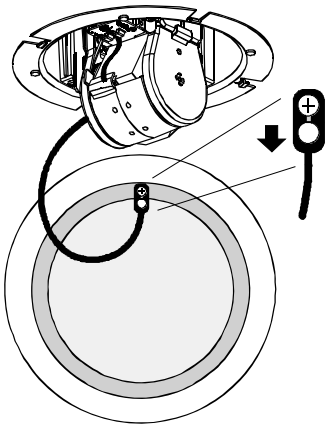
18. Apply power to dome.

    Note: When power is applied, the dome checks its function by performing a homing routine during which the camera pans and then either goes to the start point of the “apple peel” pattern or if powered up once before, to the last position in memory. Once the camera stops, the camera is online and is ready to be controlled.

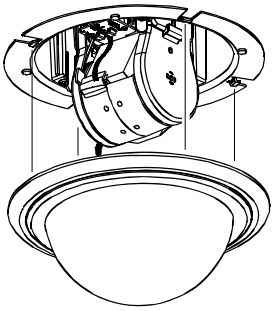
    Also, green, red, and yellow LEDs will light in various patterns to indicate status. Typically, you do not need to view these LEDs unless a failure occurs during or after the routine. See “Troubleshooting” for an explanation of the LED patterns.

19. Once the homing routine completes, affix the bubble to the dome as follows:

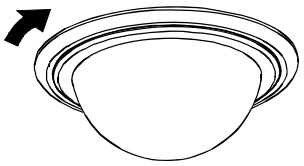
    a. Place the large hole at the end of the lanyard over the screw head of the bubble and pull its end to snap it in place. Loop the lanyard to the inside of the housing.



    b. Center the bubble over the dome housing and align its tabs with the mating tabs in the housing.



    c. Turn the bubble clockwise until it catches the tabs and stops.



Troubleshooting

If a failure cannot be easily fixed, send the dome to a repair center.

No power (no LEDs light).

Check for power coming in from J-box or controller.

Homing routine does not complete.

Green, red, and yellow LEDs are visible through small holes in the dome housing that surround the camera yoke. After power up, the LEDs light as follows:

	GREEN (DS1)	RED (DS2)	YELLOW (DS3)
PLD Loading (approx. 20 sec)	On	Off	Off
Homing Process	Off	Blink	On
Looking for Network*	On	Off	On
Online Waiting for 1st Command**	Blink	Blink	On

* If the dome remains in this state, it cannot locate either the SensorNet or Manchester network.

** The yellow LED remains on until it receives a PTZ movement command, then goes off. Further PTZ commands will cause the LED to blink; otherwise, the LED is off.

Connected to RS-422 but no communication.

Check RS-422 wiring by doing the following.

1. Set the dome address to 901; observe the green, red, and yellow LEDs through the housing.

LED Indication	Cause
Yellow blinks	Wiring OK.
Red flickers, Green blinks*	RS-422 wired backwards.
Red blinks. Green flickers*	A wire is not connected.

*Fix wiring.

2. Reset the dome to the desired address.

No video.

1. Check the video cable and its connection to the dome. If not OK, fix or replace the cable.
2. Check the iris setting. Open iris or set to auto iris.
3. If the problem cannot be corrected, send the dome to a repair center.

Video rolls when switching cameras.

Perform V-phase adjustment at the controller.

Contrast or color off.

1. Check the iris setting. Open iris or set to auto iris.
2. If the problem cannot be corrected, send the dome to a repair center.

Pan control absent or improper, but other control OK.

Send the dome to a repair center.

Tilt control absent or improper, but other control OK.

1. Check tilt belt operation. Fix the belt if necessary.
2. If the problem cannot be corrected, send the dome to a repair center.

Zoom, focus, and iris control is absent.

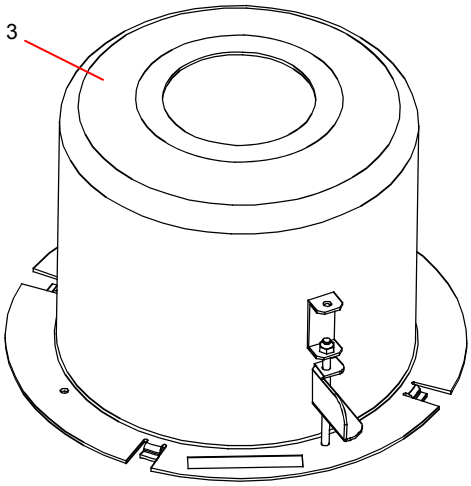
Check the flex cable connecting the camera the housing. If you see damage, send the dome to a repair center.

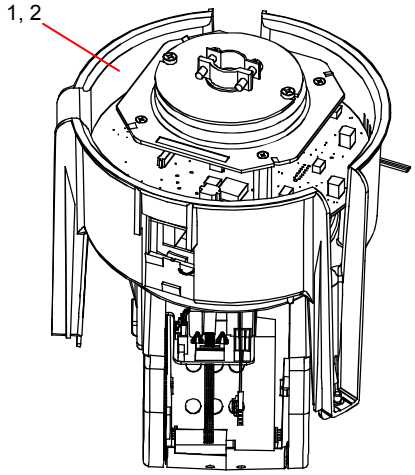
Only some camera control (for example, zoom and focus works, iris doesn't).

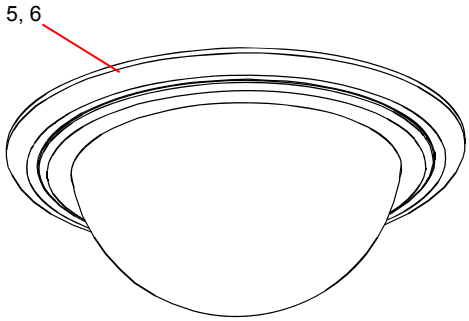
Send the dome to a repair center.

Parts List for Authorized Users

The following parts can only be ordered by authorized users. To become authorized, contact your sales representative.







General

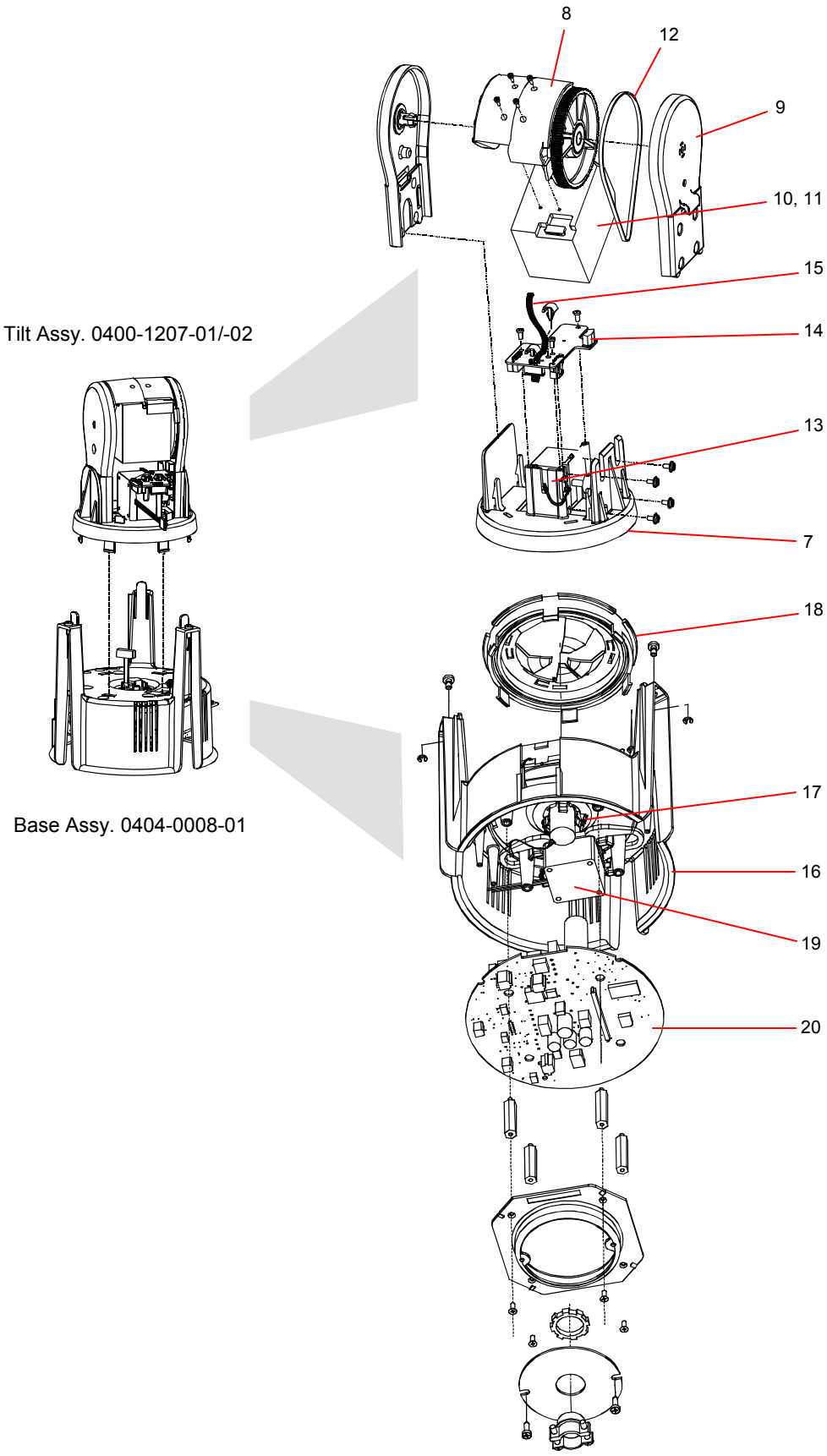
1	Chassis Assembly, NTSC	0101-0013-01
2	Chassis Assembly, PAL	0101-0013-02
3	Housing Assembly	0404-0009-01
4	Install Kit	0352-0020-01
5	Bubble Assembly, Clear	0100-2458-01
6	Bubble Assembly, Smoked	0100-2458-02

Tilt Assy. 0400-1207-01 (NTSC), -02 (PAL)

7	Base, Tilt	0500-9110-01
8	Gear, Camera Base	0500-9112-01
9	Tilt Upright (2)	0500-9168-01
10	Camera, 1/4" CCD, NTSC, STD, 22XM	2003-0049-01
11	Camera,1/4" CCD, PAL, STD, 22XM	2003-0049-02
12	Timing Belt	2500-0041-01
13	Tilt Motor with Pully	3501-0028-01
14	PCB, Tilt Sensor	0312-1524-01
15	Ribbon Cable, 20mm, Blk	6007-0039-03

Base Assy. 0404-0008-01

16	Base, Pan	0500-9109-01
17	Slip Ring	2100-0006-02
18	Bearing, Pan	2510-0040-01
19	Pan Motor Assy.	0400-1240-01
20	PCB, Dome System	0312-1620-01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Tilt Assy. 0400-1207-01/-02
Base Assy. 0404-0008-01

Specifications

Operation

Manual pan speed ..... 1–50° per second
Target pan speed ..... 100° per second max.
Pan travel .....360° continuous, no end stop
Manual tilt speed ..... 1–50° per second
Target tilt speed..... 50° per second max.
Tilt travel ..... >90°
Optical zoom 22X
Digital zoom..... 11X
Bubble density..... Clear, f0
Tilt/Pan accuracy..... ±0.5°
Zoom/Focus accuracy ..... ±0.5%
Quick View™ access:

- < 2 seconds to pan and tilt position
- < 3 seconds to full zoom position
- < 1 second focus on VM16 and VideoManager controllers
- < 7 seconds focus on VM96 and RV2715 controllers

Synchronization.....Automatically selected
Line locked .....Remote V-phase adjustment
Internal.....Built-in sync generator
Program storage.....256KB of electrically programmable Flash Memory
Data storage ..... 128KB of SRAM
Video output connector .....Female BNC
Product life .....5 years operation 500,000 position changes

Color Camera Specifications

Type.....Interline Transfer ¼" CCD array
Scanning system .....2:1 interlace
Horizontal resolution.....470 lines at center
Video out ..... 1.0 Vp-p / 75 ohms composite
Signal/Noise ..... 50dB (typical)
Minimum illumination..... 1.0 lux (20 IRE)
Gain control ..... Automatic (AGC)
White balance..... Through the Lens (TTL) Automatic Tracing White Balance (ATW)

NTSC version

Pickup device.....768 (H) x 494 (V) pixels
Scanning .....525 lines, 60 fields, 30 frames
Horizontal 15.734kHz
Vertical 59.9Hz

PAL version

Pickup device.....752 (H) x 582 (V) pixels
Scanning .....625 lines, 50 fields, 25 frames
Horizontal 15.625kHz
Vertical 50Hz

Lens

Design ..... Aspherical
Focal length .....4 to 88mm
Aperture .....f1.6 (wide), f3.8 (tele)
Scanning area..... 3.2mm (H) x 2.4mm(V)
Viewing angle:
4 mm ..... 47.0°H x 35.2°V
88 mm ..... 2.2°H x 1.65°V

Field-of-View Formulas:

$$\frac{\text{3.2 mm* x distance from camera (m)}}{\text{Focal length (mm)}} = \text{Horizontal view (m)}$$

$$\frac{\text{2.4 mm** x distance from camera (m)}}{\text{Focal length (mm)}} = \text{Vertical view (m)}$$

* Horizontal scanning area of pickup device (mm) in camera.
** Vertical scanning area of pickup device (mm) in camera.

Example: Wide angle view with lens at 6mm and viewed object at 10m.

$$\frac{\text{3.2mm x 10m}}{\text{6mm}} = \text{5.33m Horizontal view (m)}$$

$$\frac{\text{2.4mm x 10m}}{\text{6mm}} = \text{4.0m Vertical view (m)}$$

Electrical Specifications

Power Line

Input voltage .....18–30Vac, Class 2 Limited Power Source
Design tolerance.....16–36Vac
Line frequency 50/60Hz
Power consumption .....21W max.
Power on inrush current.....3A
Allowable drop out 33ms
Connector ..... Plug-in Euro-style terminal block 5.08mm
Max. cable distance ..... See chart on page 4

Surge Protection

Video output gas discharge tube rated at:

- 8/20µs impulse discharge current: 10kA
- Ten 8/20µs impulses discharge current: 5kA
- 3.9 ohm series resistors
- Low capacitance Zener suppressor 6.5V 1500W

Power line gas discharge tube impulse rated at:

- 8/20µs impulse discharge current: 10kA
- Ten 8/20µs impulses discharge current: 5kA
- TVS rated at 60V, 250A, 1.5 Joules, 8/20µs impulse

SensorNet/Manchester gas discharge tube impulse rated at:

- 8/20µs impulse discharge current: 10kA
- Ten 8/20µs impulses discharge current: 5kA
- Isolation transformer coupled, 2000Vrms
- PTC resettable fuse protects transformer
- TVS rated at 5.6V, 40A, 0.1 Joules, 8/20µs impulse

EIA-422 comm gas discharge tube impulse rated at:

- 8/20µs Impulse discharge current: 10kA
- Ten 8/20 µs Impulses Discharge Current: 5kA
- 33 ohm series resistors
- TVS rated at 5.6V, 40A, 0.1 Joules, 8/20µs impulse

SensorNet Communications

Network distance 1km
Maximum loads ..... 32 per node
Node repeaters ..... SensorNet junction boxes
Cable topologies ..... Daisy chain
Backbone
Star
Transmission medium ..... Single non-polarized unshielded twisted pair UTP 22AWG
Wire configuration .... Single unshielded twisted pair UTP 22AWG non-polarized
Connector ..... Plug-in Euro-style terminal block 5.08mm
Terminating resistor ... 120 ohms, switch selectable

EIA-422 Communications

Network Distance 1km
Maximum Loads 10/node
Cable topologies ..... Daisy chain
Star
Wire configuration ..... One twisted pair 22AWG, polarized, shielded
Connector ..... Plug-in Euro-style terminal block 3.81mm

Manchester Communications

Network distance 1.5km
Maximum loads ..... 32 per node
Node repeaters ..... SensorNet junction boxes
Cable topology ..... Daisy chain
Transmission medium. Single polarized twisted pair 18AWG (Beldon 8760)
Connector ..... Plug-in Euro-style terminal block 5.08mm
Terminating resistor .... 120 ohms, switch selectable

Mechanical Specifications

Camera Dome

Housing diameter 190mm (7.5in)
Housing height:
(above ceiling) 210mm (8.26in)
Bubble diameter 178mm (7.0in)
Bubble depth (below ceiling) 94mm (3.7in)
Weight ..... 2.5kg (5.5 lbs)

Environmental Specifications

Indoor operating temperature ..... –10°C to 50°C (14°F to 122°F)
Humidity ..... 0–95% non-condensing
Storage temperature ..... –20°C to 65°C (–4°F to 149°F)

Declarations

Regulatory Compliance

REG ID ..... SV SDUW

Emissions ..... 47 CFR, Part 15
EN 50130-4
ICES-003
EN 55022

Safety UL1950
CSA C22.2 No 950
EN 60 950

FCC COMPLIANCE: This equipment complies with Part 15 of the FCC rules for intentional radiators and Class A digital devices when installed and used in accordance with the instruction manual. Following these rules provides reasonable protection against harmful interference from equipment operated in a commercial area. This equipment should not be installed in a residential area as it can radiate radio frequency energy that could interfere with radio communications, a situation the user would have to fix at their own expense.

EQUIPMENT MODIFICATION CAUTION: Equipment changes or modifications not expressly approved by Sensormatic Electronics Corporation, the party responsible for FCC compliance, could void the user's authority to operate the equipment and could create a hazardous condition.

Other Declarations

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MDR (shf) 08/2006