

Pulse Index

By Rafael Lozano-Hemmer



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General important information

If you would like support for the piece please feel free to call Lozano-Hemmer's studio in Canada:

Antimodular Research
4060 St-Laurent, studio 107
Montréal Québec H2W 1Y9 Canada
Tel 1-514-597-0917 Fax 1-514-597-2092
info@antimodular.com
www.antimodular.com

Pulse Index (2010), Fingerprint recorder, pulse meter, computer, high definition plasma screen.

By Rafael Lozano-Hemmer

Description

Pulse Index displays the fingerprints of the 765 most recent participants, each of them palpitating to the rhythm of their heartbeats.

Operation

1. Connect the computer and the monitor to electrical power using an extension cord which connects to the power cables and/or power supplies.

You may connect the piece to 100-120V 60Hz (American) or to 210-240V 50Hz (European) current, as every component is equipped with an auto switching power supply.

2. Connect the firewire and USB cables as described in the "Placement Instructions" sections ().

3. To turn the piece ON, power on the monitor with the power button on the monitor or the remote control power button, then firmly press the power button of the mac mini computer in the back of the piece, on the right side. *Important note: Please do not push the button again as this will shut down the piece. A picture of the back part of the computer is shown on the next page.*

4. To turn the piece OFF, firmly press the power button once, for no longer than 2 seconds. Turn off the monitor with the power button of the monitor or the remote control power button.

Cleaning

Please do not clean the display surface with Windex or soap. Use a lint-free cloth and LCD screen liquid cleaner, such as Kensington Screen Guardian found in computer stores. The same applies for the aluminium cylinder.

Placement Instructions

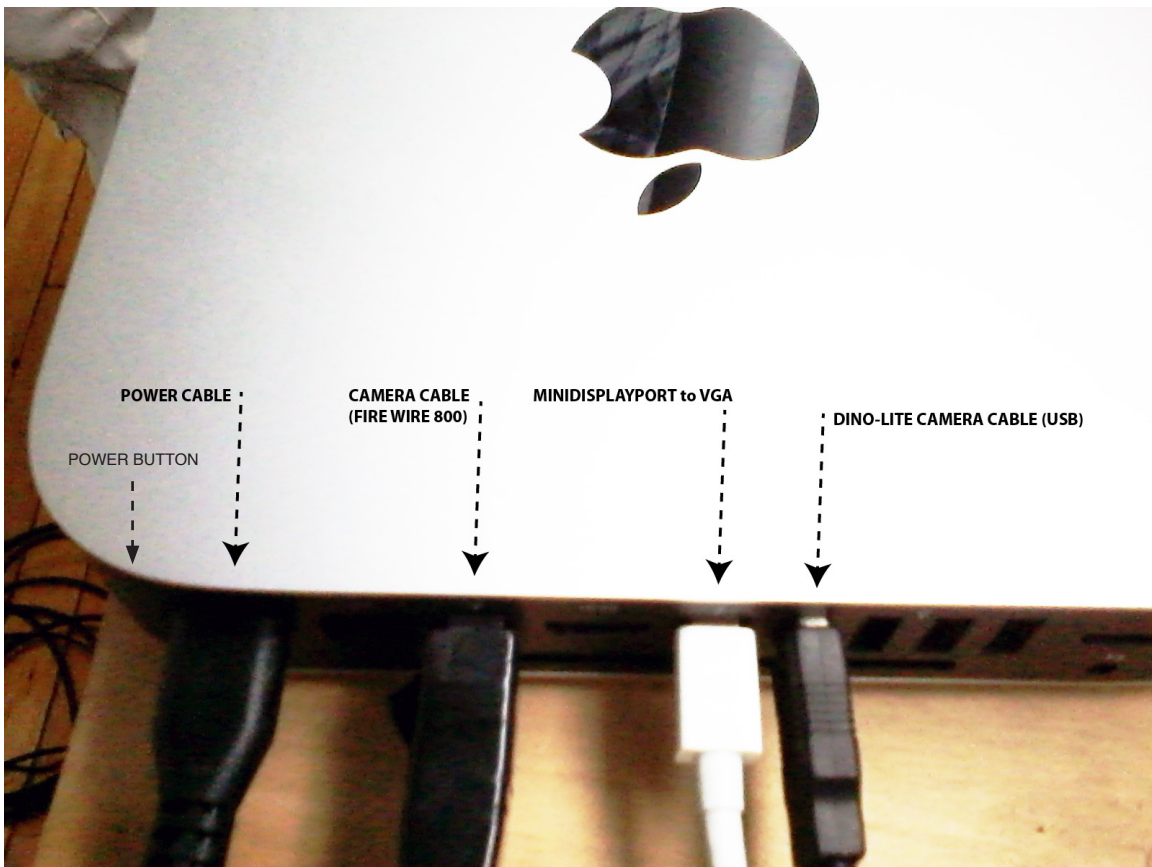
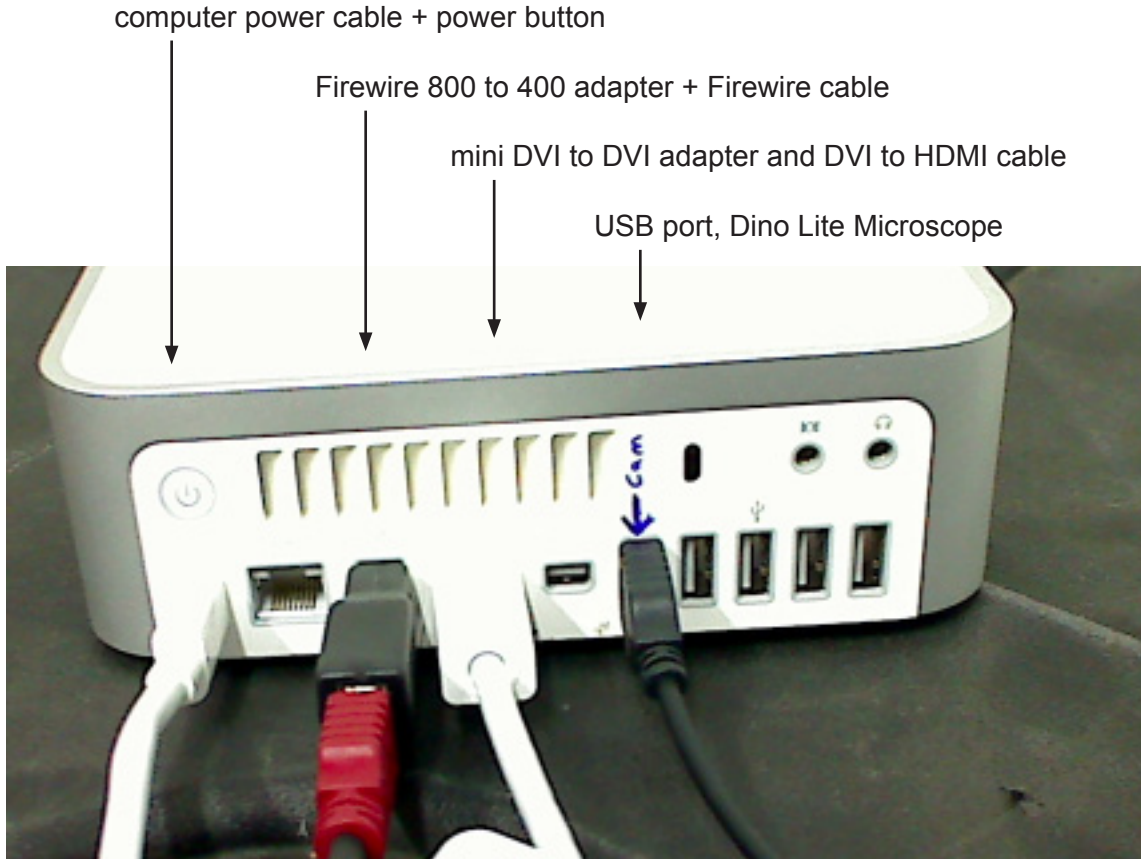
The piece should be hung with the bottom of the plasma screen at 85 cm (34 inches) from the ground, using the provided "Peerless" plasma mounting system. Instructions for this are included in Appendix 1 of this manual.

The Fingerprint recorder (brushed aluminium cylinder) should be hung to the right of the plasma screen. Place the Fingerprint recorder so it aligns with the middle of the first large fingerprint image. (see image on cover page)

There are three cables running from the Fingerprint recorder to the computer. These cables should be hidden inside a cable channel, or can be passed behind the wall. The Fingerprint recorder has three possible exit holes for the usb-cable, firewire-cable and ground cable. Two holes are in the back and the other at the bottom. One of the three cables is a thin black grounding cable with a metal clamp on one end. Clamp this cable to a unpainted metal part of the plasma screen's metal frame to ensure proper grounding of the fingerprint recorder. The cable can be shorted if needed: ensure to create a clamp by stripping the end of the cable. The two other cables, one USB and one firewire 800, are used by the

sensor to detect the heartbeat and to take pictures of fingerprints.

Here are two views of how the cables should be connected to the computer. There are slight variations depending on the computer given with the piece.

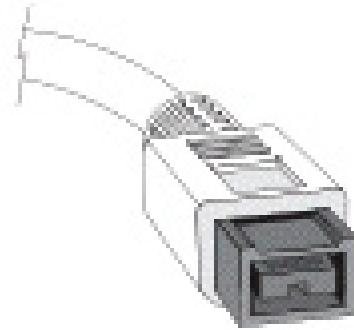


Here are some pictures of the cable connectors.

Power cable:



AVT camera cable:



9-pin

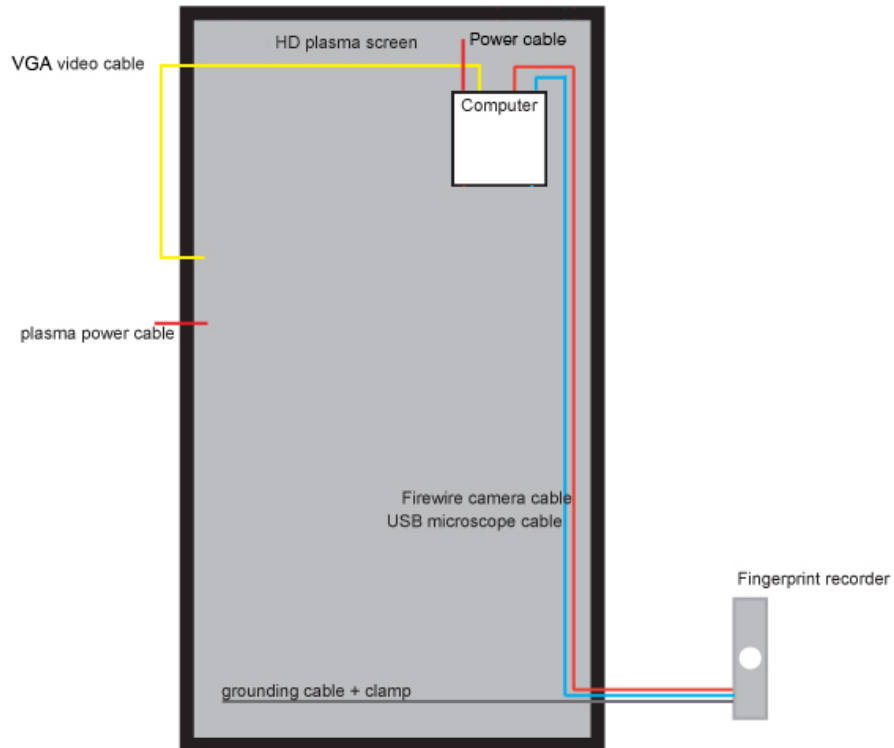
Dino-Lite camera cable:



Monitor cable:



The emplacement of the computer remains your decision. We recommend to place it between the wall and the monitor, sitting on the wallmount, with the computer connectors side facing up.



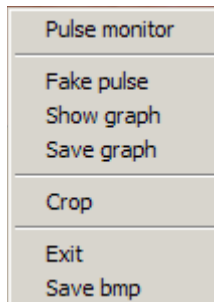
Another option to place the computer near the piece on a little shelf. If you choose that option, make sure to leave enough space between the computer and the wall as the wires and connectors need it to do the 90 degrees bend to go from the computer to the wall.



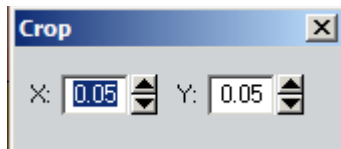
You can also use a cable hiding channel to hide the cables going from the sensor to the computer

Software

Most of the settings in the software self-calibrate automatically when the piece starts up. However, there are some software tools that may be useful if you would like to optimize the performance of the system. To change settings in the software, plug the included mouse into one of the computer's USB ports. Once the mouse is connected you may right click to reveal a pop-up menu. It may take a couple of seconds for the pop-up to appear. There are seven choices, the first four of which are diagnostic tools reserved to our crew in case of issues with the piece. Proceed with care, as choosing "Fake pulse" will create blank pulses and fingerprints. The two choices that may be of interest to you are "Crop" and "Exit".



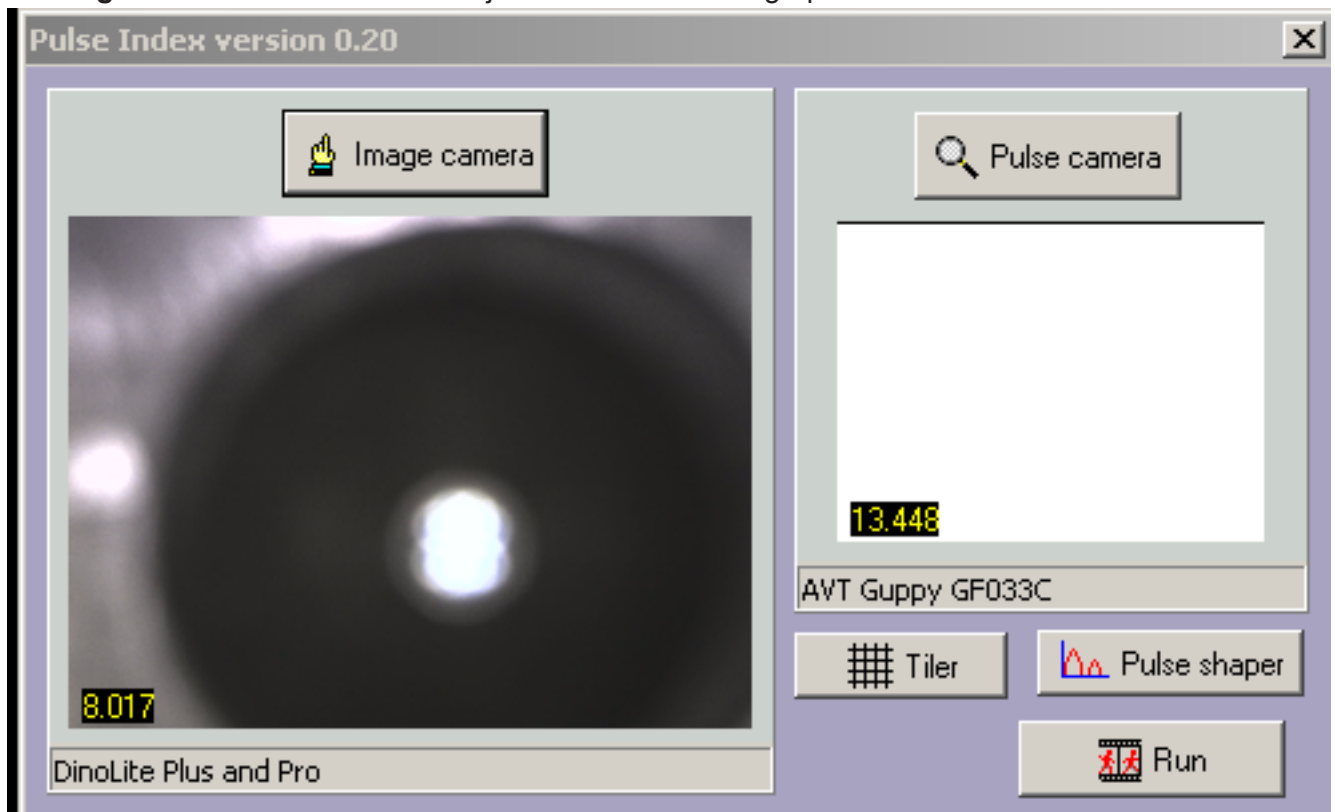
A. Crop – This crops the edge of each displayed fingerprint.



B. Exit – Select this to exit the program, this will take you to the main settings window.

Settings window (displayed below, accessed by choosing "Exit" from the drop-down menu) :

A. Image Camera – Select this to adjust the look of the fingerprints.



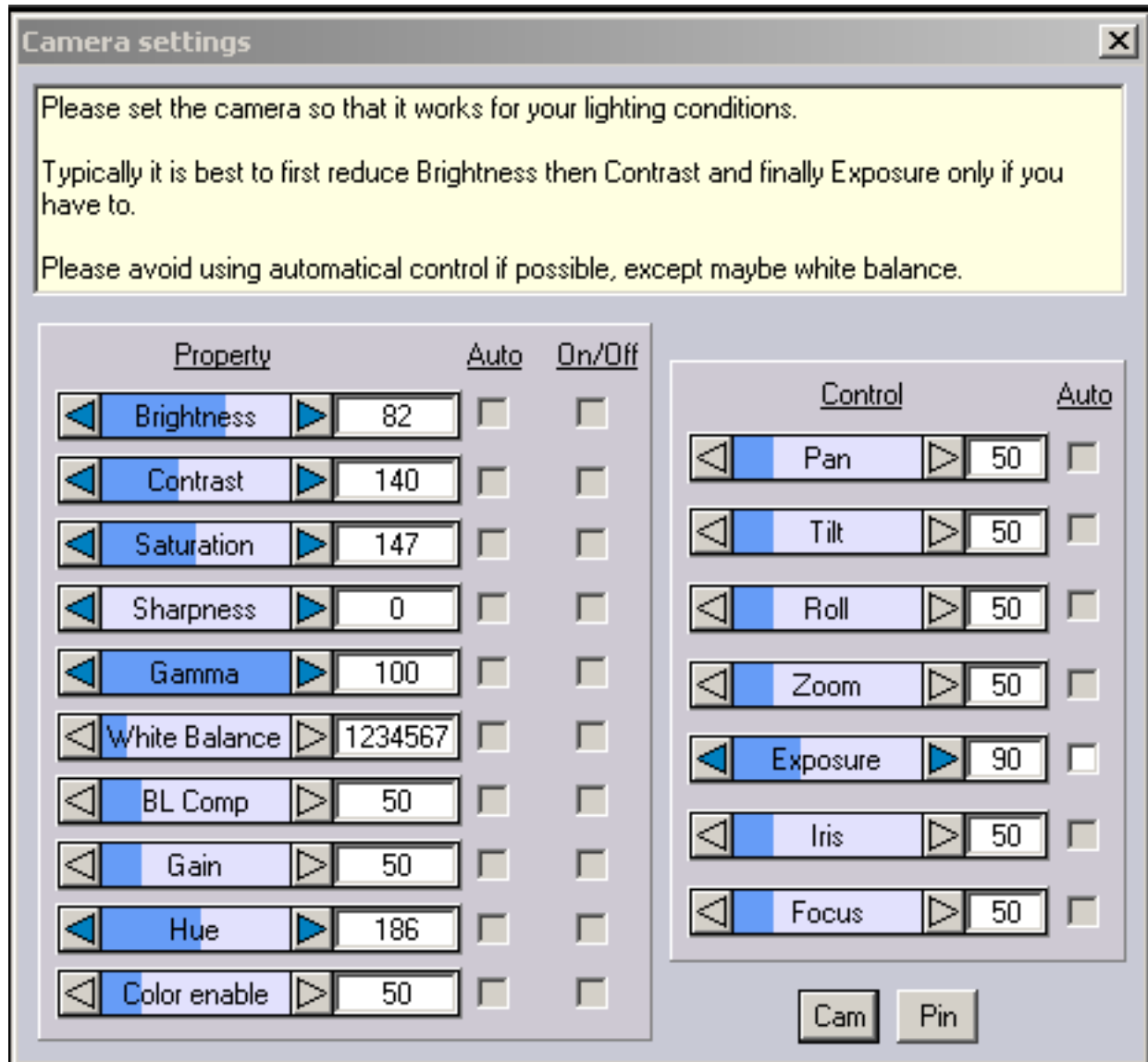
- B. Pulse Camera** – Select this to adjust the heart rate digitization.
- C. Pulse shaper** – Select this to change the pulsing of the fingerprints.
- D. Run** – Select this to run the program, —this will take you back to the main application window.

A. Image Camera

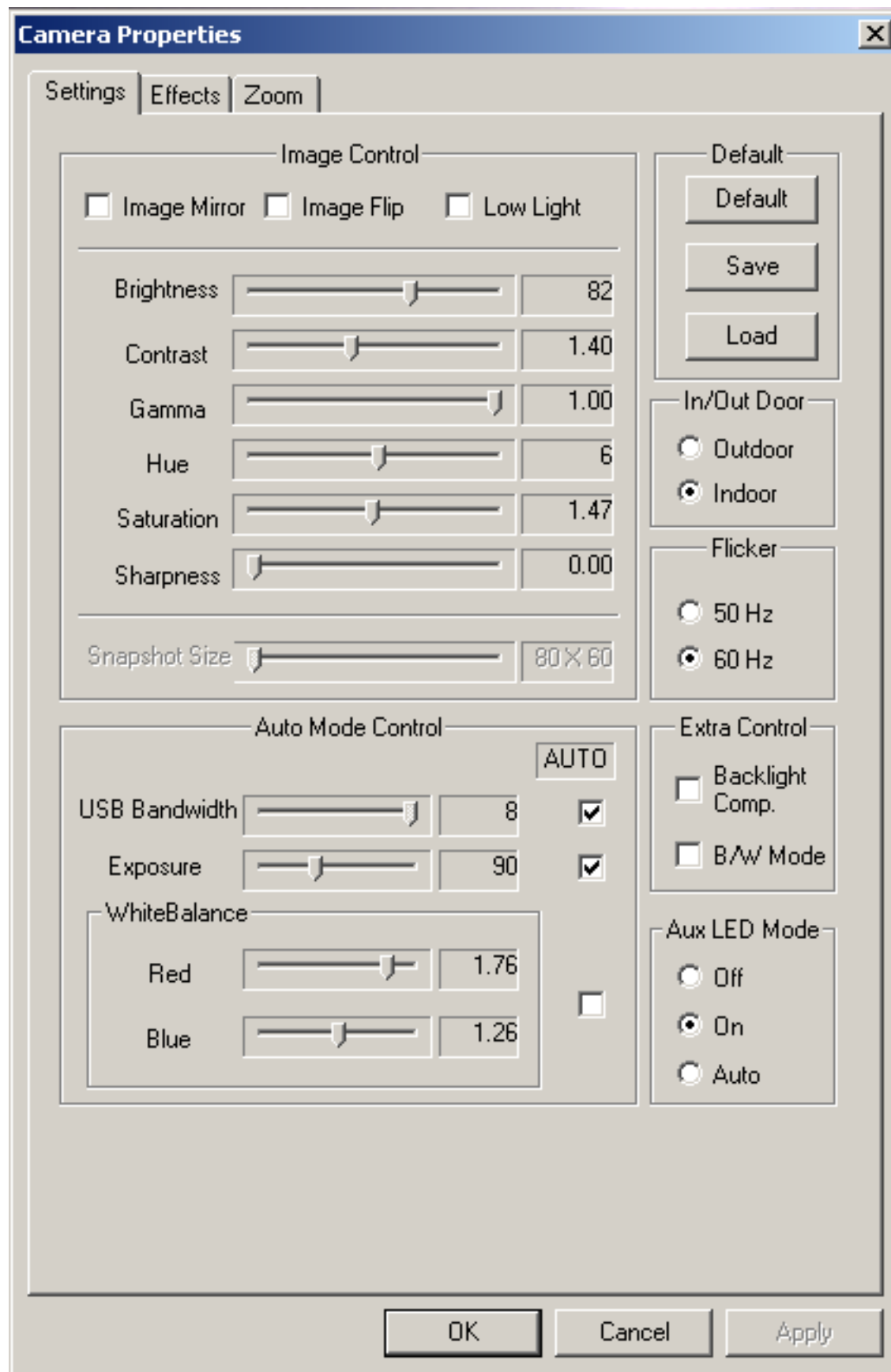
A large live video window will open with the view of the fingerprint microscope.

Select the settings button to open the Camera Settings.

These are the recommended values:

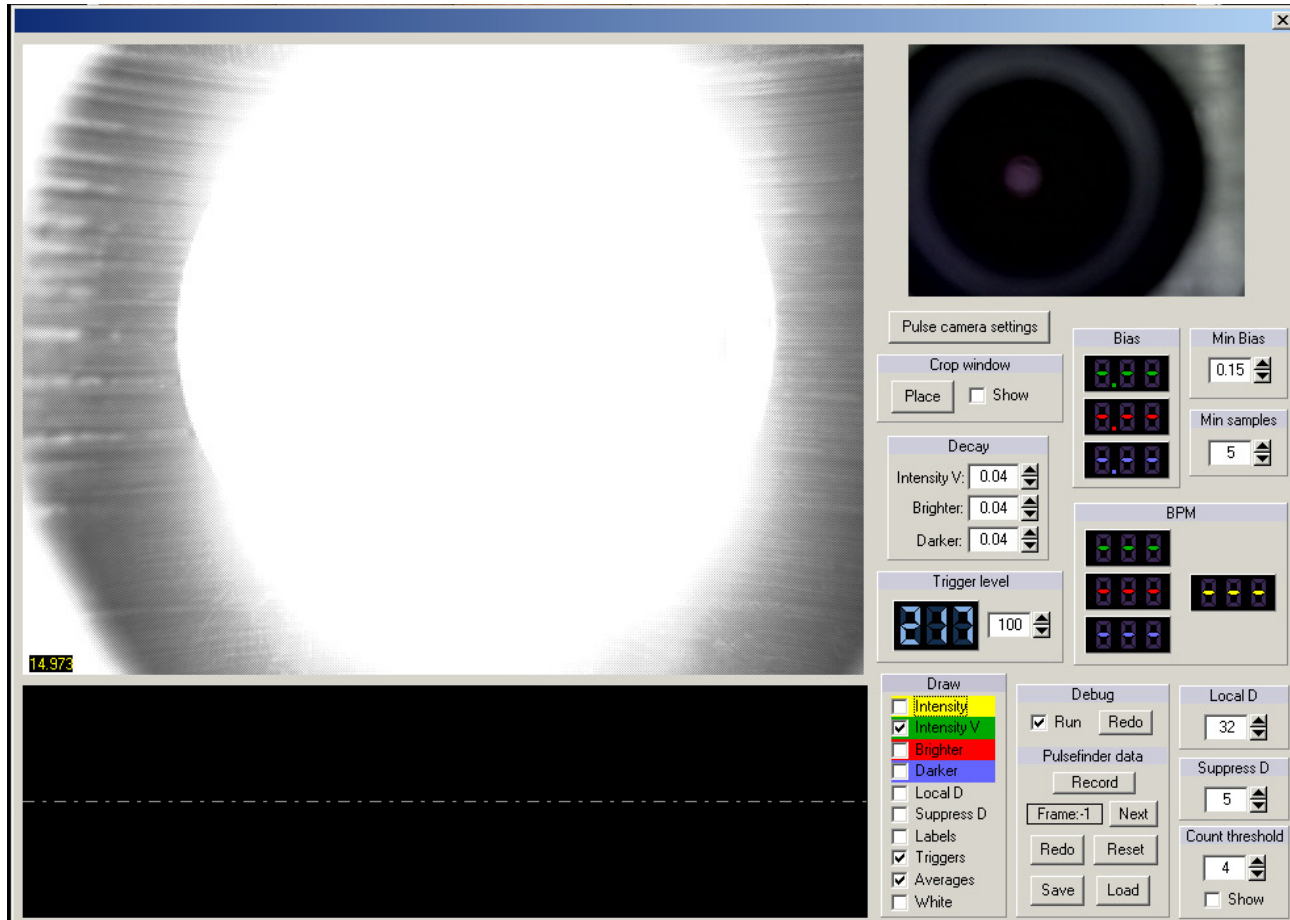


Select the Cam button to open a Camera Properties window relating to the Dino-Lite microscope :



B. Pulse Camera

This window is used to adjust the way the heart rate is extracted from the AVT video image.



The **Pulse Camera settings** button will open a window to let you control basic camera settings like gain, white balance, brightness and exposure. These should be set to provide a reasonable image when your finger is inserted into the sensor. Its normal for the image to appear washed out when no finger is inserted as the microscope leds are shining directly into the camera. When a finger is in place you should be able to see a reasonable image.

Press the crop window **Place** button to set the crop window. The computer will only consider the part of the image inside this window, so the window should be set to discard any part of the image that isn't covered by your finger as these sections of the image provide no data to the computer and hence will lower the signal to noise ratio.

The **Decay** panel should not normally be touched. The pulse finder looks for peaks in the signal and keeps a running value of the peak. Any subsequent value that is greater than this peak is considered a new peak. This peak value has a “decay” so it diminishes over time to compensate for any dc offset fluctuation. On the graph at the bottom there is a dashed line that shows this decay. This line should fairly closely follow the slope of the signal - if its taking too long to fall and new peaks are being missed you can increase this value. If its falling too fast you will get false peaks - in this case decrease this value. The system actually monitors three curves from the camera and picks the one it thinks looks most like a pulse, so there are separate values for each of these curves. **Intensity V** refers to the velocity of intensity change - ie how quickly the average intensity is changing from frame to frame. The system also counts how many pixels are brighter than they were last frame, as well as how many pixels are darker than last frame. These two curves are called the **Brighter** and **Darker** curves respectively.

The **trigger level parameter** controls the intensity level at which the computer considers a finger to be in

place. This is probably the easiest setting to adjust. Simply make sure the level shown is well above this value when no finger is in place and well below this value when a finger is inserted. So if, for example, the level is at 200 with no finger in place, and 50 when the sensor is covered, a good safe value would be 1/2 way between the two - so in this case 125.

The **Draw** section simply contains the draw options for the graph. Check off only what you want to see so the graph isn't too busy and confusing.

The **Bias** section shows the "bias" level for each of the three graphs. The bias refers to how much the signal varies from its average. Hence a peaky or spikey signal will have a low bias - which is good - whereas a flat signal will have a higher bias, closer to 0.5. This value should be set as low as possible (while still being able to find a pulse) so the system favors signals with peaks as opposed to signals that are flat. A valid pulse signal will have a lower bias than an invalid signal. Green refers to the intensity velocity, red is the brighter pixel count, and blue is the dimmer count.

The **Min Samples** section refers to how many valid BPM readings in a row are required to accept the BPM as valid. If the system is having a hard time finding a pulse, lower this value. If false pulses are found try raising this value.

The **BPM** section shows the number of beats detected per minute from each of the three graphs. The yellow readout shows the final reading that the system has decided is legitimate.

The **Debug** section is for internal development and should not be touched by anyone but the most adventurous.

The **Local D** parameter refers to how many samples back the system will look for a peak. This distance can be shown on the graph - make sure this value is large enough to reach the previous peak but not so large as to include more than one peak back.

The algorithm also includes a method called "non-maximal suppression". With this, the computer looks at the signal back in time and removes the lowest of any peaks that are clustered too closely together. The minimum spacing between the peaks is governed by the **Suppress D** parameter.

Finally, the **Count Threshold** is the value the system uses to determine if a pixel is brighter or darker than the previous frame. So if this value is set to 10 for example, and a pixel at one frame is 100 and the next is 110 or higher, this pixel will be considered brighter. Any pixel lower than 110 will not be considered brighter even though technically it is. This is useful for removing camera noise in the signal.

This is perhaps one of the most critical settings and probably the only one that should be changed by the average user besides the camera settings, crop window, and the **Trigger level**. In the camera image if you select **Brighter** or **Darker** in the draw section you can see the pixels from frame to frame that the computer considers brighter or darker. Adjust this value so a reasonable number of pixels are changing when a valid pulse is present. If only a few pixels are changing lower this value.

C. Pulse shaper

These settings shape the double pulsing of the displayed fingerprints and should be left at the default settings.

Troubleshooting

wrong resolution

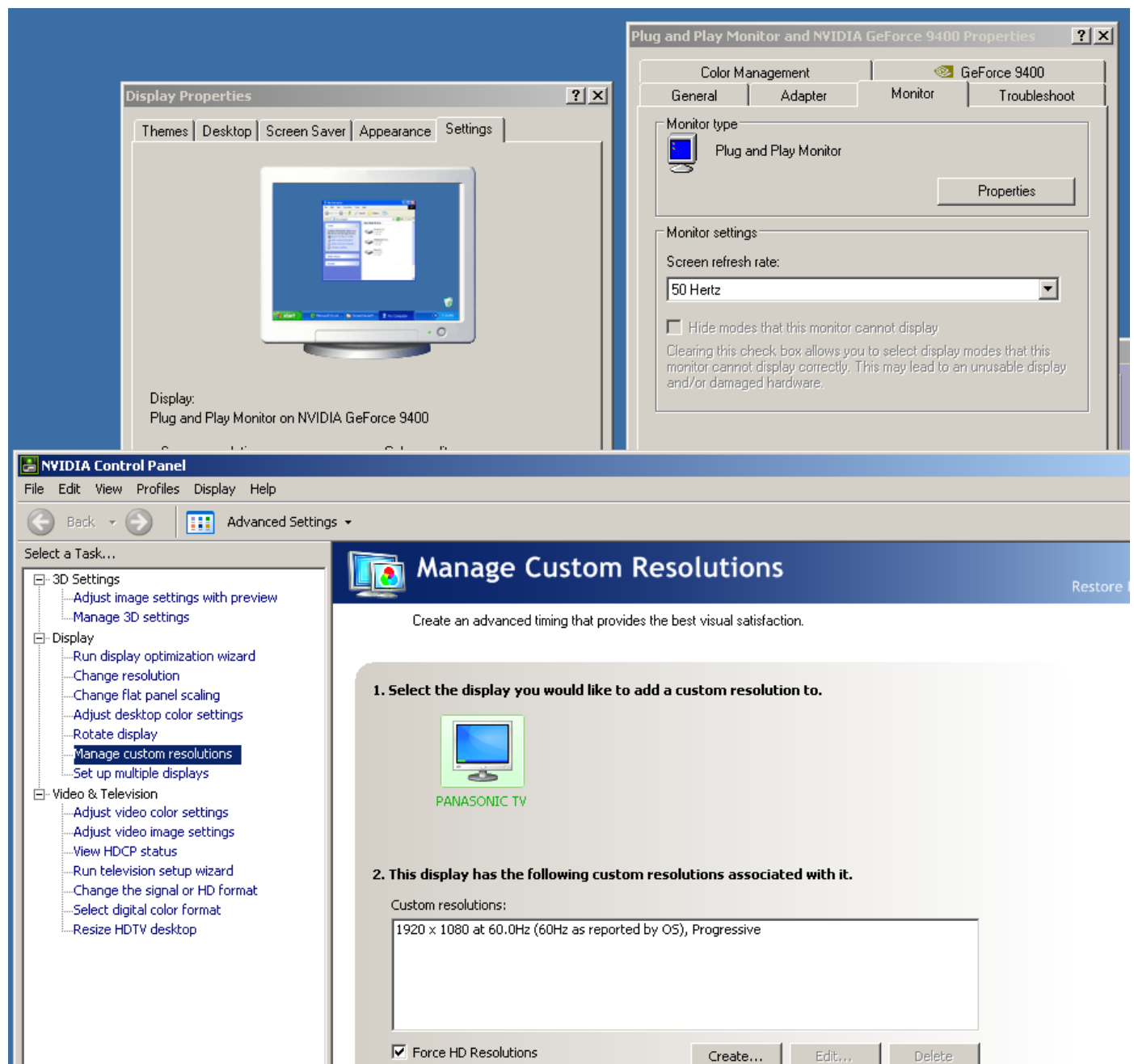
Please compare the image in appendix 4 with your screen. You should see 17 rows of images. The image may be cropped if Windows is set to a resolution other than 1920 x1080 (portrait).

Make sure the monitor has been turned on before the computer. If not, restart the computer.

Also, if the monitor is from Panasonic, check the display mode of the HD plasma screen. It should be set to FULL.

jittering edges

Make sure both nvidia and advanced screen settings are set to the same refresh frequency of either 50Hz (America) or 60Hz (Europe), depending on the local electrical properties.



no camera found

Check the firewire and usb connection to the computer. They need to be tightly plugged. Make sure the microscope's USB plug is plugged into the right USB port, which should be marked on the mini. If no port is marked, experiment with different ports.

Stop and restart the software.

static shock and/or sudden camera drop out

One of the three cables running from the Fingerprint recorder to the computer is a grounding cable with a small metal clamp on it. Make sure this clamp is connected to a metal part of the display's frame.

Support

If you would like support for the piece please feel free to call Lozano-Hemmer's studio in Canada:

Antimodular Research
4060 St-Laurent, studio 107
Montréal Québec H2W 1Y9 Canada
Tel 1-514-597-0917 Fax 1-514-597-2092
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www.antimodular.com

Appendix 1 – Monitor wall mount



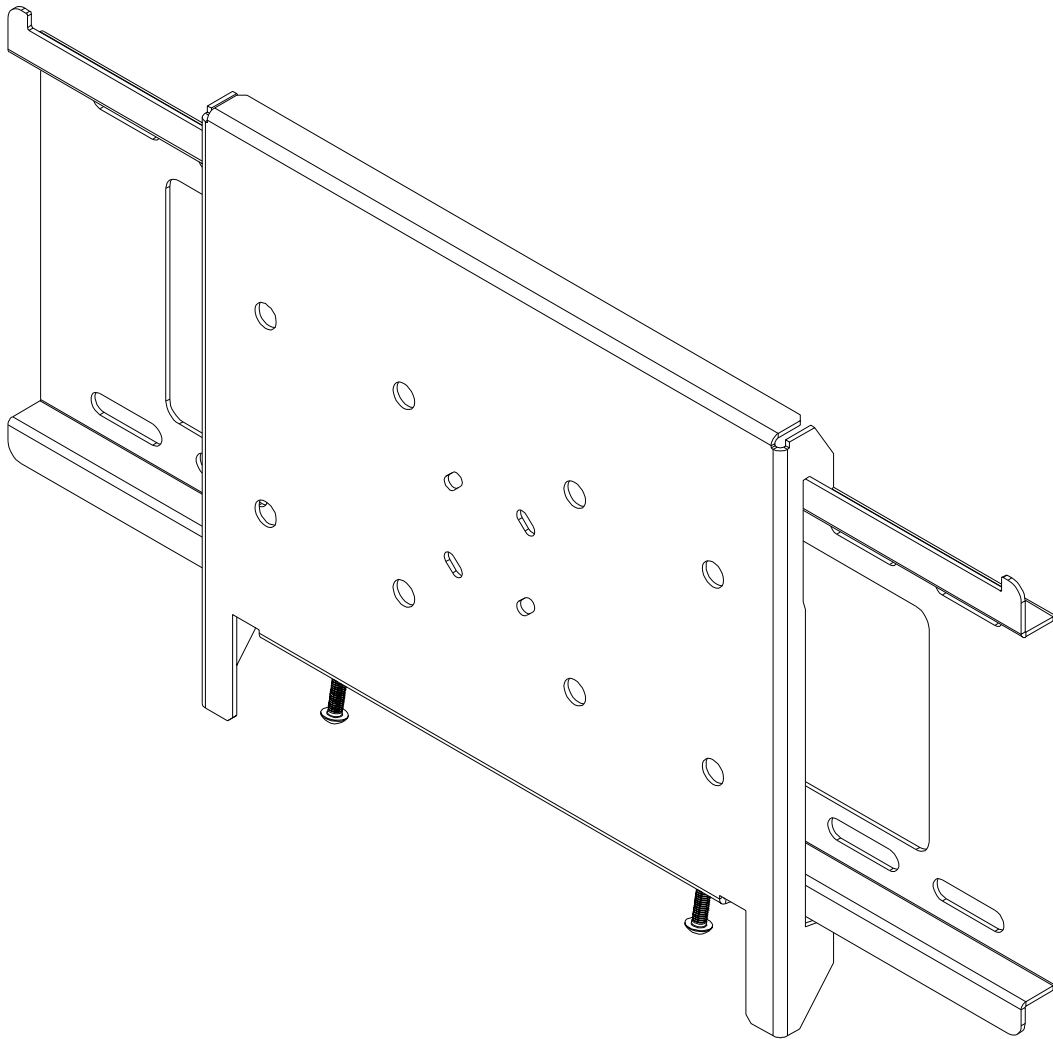
Solid Solutions - Solid Support™

Installation and Assembly:

SmartMount™

Dedicated Flat Wall Mount for Flat Panel Screens

Models: SF 16D



Features:

- Ultra-slim design holds the screen flat against the wall
- Integrated security features provide effective theft deterrence

Max. Load Capacity: 200 lb (90.7 kg)

Note: Read entire instruction sheet before you start installation and assembly.

⚠ WARNING

- Do not begin to install your Peerless product until you have read and understood the instructions and warnings contained in this Installation Sheet. If you have any questions regarding any of the instructions or warnings, please call Peerless customer care at 1-800-729-0307.
- This product should only be installed by a qualified professional.
- Make sure that the supporting surface will safely support the combined load of the equipment and all attached hardware and components.
- Never exceed the Maximum Load Capacity of 200 lb (90.7 kg).
- If mounting to wood wall studs, make sure that mounting screws are anchored into the center of the studs. Use of an "edge to edge" stud finder is highly recommended.
- Always use an assistant or mechanical lifting equipment to safely lift and position equipment.
- Tighten screws firmly, but do not overtighten. Overtightening can damage the items, greatly reducing their holding power.

Tools Needed for Assembly

- stud finder ("edge to edge" stud finder is recommended)
- drill
- 1/4" bit for concrete and cinder block wall
- 1/2" bit for metal stud wall
- 5/32" bit for metal or wood stud wall
- 3/8" socket wrench (socket with extended driver recommended)
- level
- 6 mm allen wrench

Accessories

- Metal Stud Fastener Kit (ACC 415)

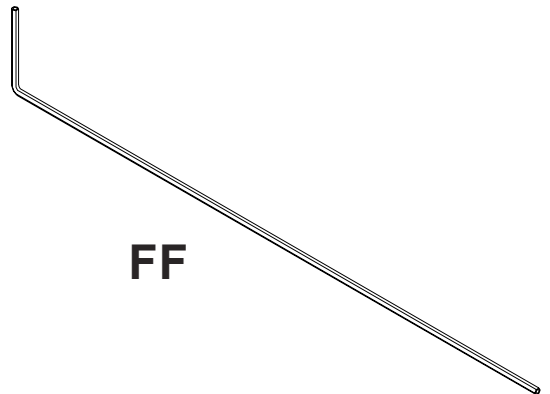
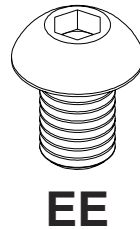
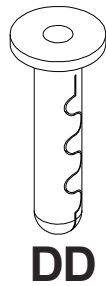
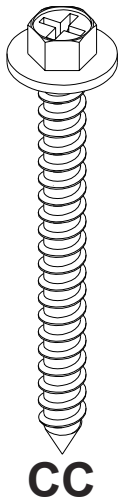
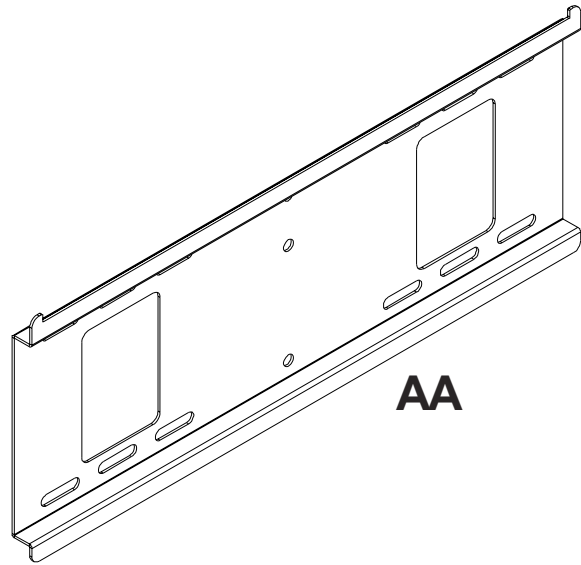
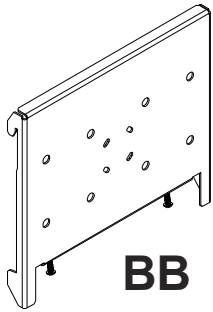
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For customer care call (800) 729-0307 or (708) 865-8870.

Parts List

| Description | Qty. | Part # |
|--|------|-------------|
| AA wall plate | 1 | 200-1797 |
| BB interface plate | 1 | 200-0860 |
| CC #14 x 2.5" wood screw | 4 | 5S1-015-C03 |
| DD Alligator® anchor | 4 | 590-0097 |
| EE M10 x 1.5 x 15 mm socket head screw | 4 | 520-9262 |
| FF 4 mm security allen wrench | 1 | 560-1146 |



Installation to Single Wood Stud Wall

⚠ WARNING

- Installer must verify that the supporting surface will safely support the combined weight of all attached equipment and hardware.

- 1 Use a stud finder to locate the edges of the stud. Use of an edge-to-edge stud finder is highly recommended. Based on its edges, draw a vertical line down the stud's center. Place wall plate (**AA**) on wall as a template, making sure that the three mounting holes are over the stud centerline. The top mounting hole should be 2.5" above the desired screen center as shown in figure 1.1. Level plate, and mark the center of the three holes. Drill three 5/32" (4 mm) dia. holes 2-1/2" (65 mm) deep. Make sure that the wall plate is level, secure it using three #14 x 2.5" wood screws (**CC**) as shown in figure 1.2.

Skip to step 2 on page 7.

⚠ WARNING

- Tighten wood screws so that wall plate is firmly attached, but do not overtighten. Overtightening can damage the screws, greatly reducing their holding power.
- Never tighten in excess of 80 in. • lb (9 N.M.).
- Make sure that mounting screws are anchored into the center of the stud. The use of an "edge to edge" stud finder is highly recommended.
- Hardware provided is for attachment of mount through standard thickness drywall or plaster into wood studs. Installers are responsible to provide hardware for other types of mounting situations.

CS = center of screen

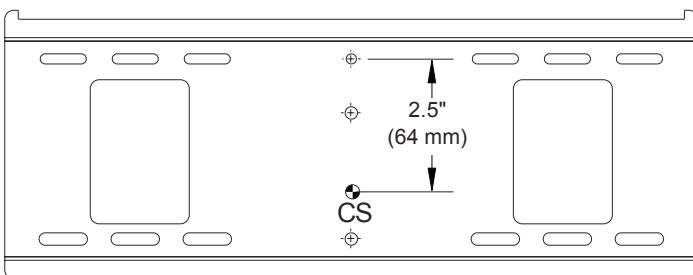


fig. 1.1

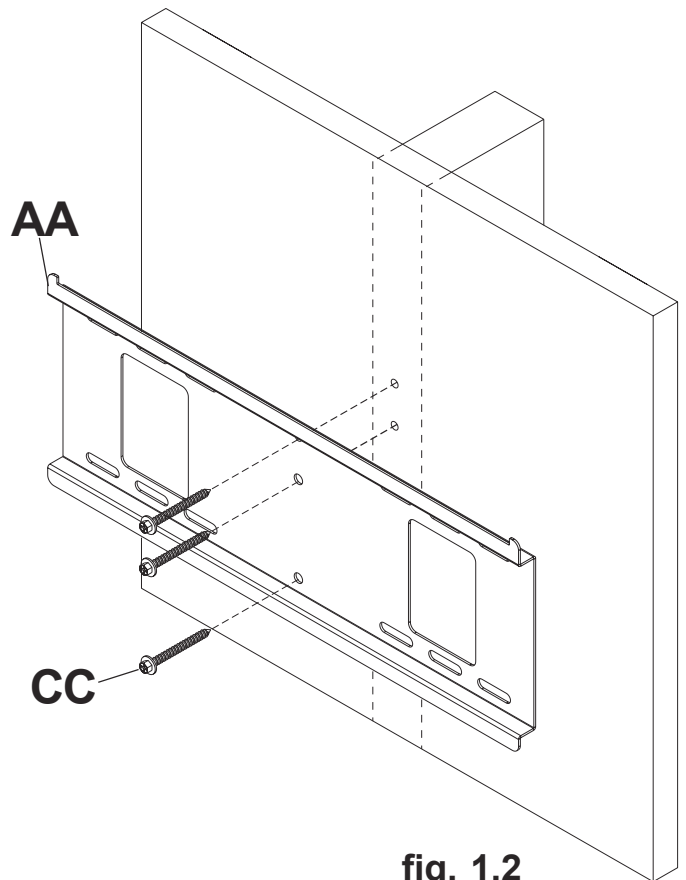


fig. 1.2

Installation to Double Wood Stud Wall

⚠ WARNING

- Installer must verify that the supporting surface will safely support the combined weight of all attached equipment and hardware.

- 1 Wall plate (**AA**) can be mounted to two studs that are 16" apart. Use a stud finder to locate the edges of the studs. Use of an edge-to-edge stud finder is highly recommended. Based on their edges, draw a vertical line down each stud's center. Place wall plate on wall as a template. The top mounting slots should be 2.5" above the desired screen center as shown in figure 1.3. Level plate, and mark the center of the four mounting holes. Make sure that the mounting holes are on the stud centerlines. Drill four 5/32" (4 mm) dia. holes 2-1/2" (65 mm) deep. Make sure that the wall plate is level, secure it using four #14 x 2.5" wood screws (**CC**) as shown in figure 1.4.

Skip to step 2 on page 7.

⚠ WARNING

- Tighten wood screws so that wall plate is firmly attached, but do not overtighten. Overtightening can damage the screws, greatly reducing their holding power.
- Never tighten in excess of 80 in. • lb (9 N.M.).
- Make sure that mounting screws are anchored into the center of the stud. The use of an "edge to edge" stud finder is highly recommended.
- Hardware provided is for attachment of mount through standard thickness drywall or plaster into wood studs. Installers are responsible to provide hardware for other types of mounting situations.

CS = center of screen

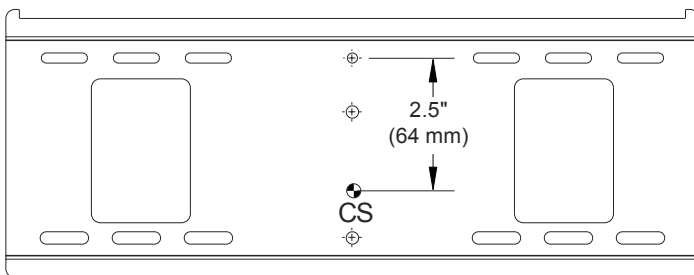


fig. 1.3

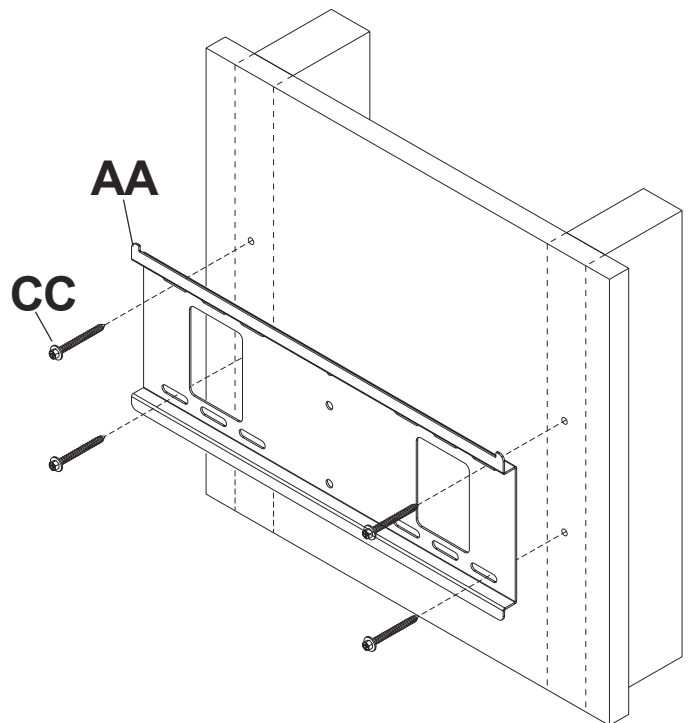


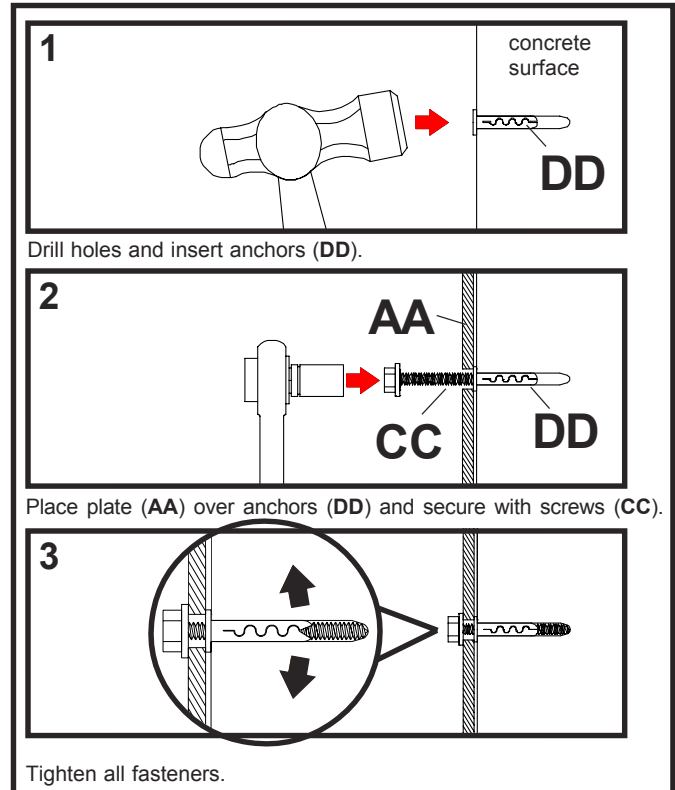
fig. 1.4

Installation to Solid Concrete or Cinder Block

⚠ WARNING

- When installing Peerless wall mounts on cinder block, verify that you have a minimum of 1-3/8" of actual concrete thickness in the hole to be used for the concrete anchors. Do not drill into mortar joints! Be sure to mount in a solid part of the block, generally 1" minimum from the side of the block. Cinder block must meet ASTM C-90 specifications. It is suggested that a standard electric drill on slow setting is used to drill the hole instead of a hammer drill to avoid breaking out the back of the hole when entering a void or cavity.
- Concrete must be 2000 psi density minimum. Lighter density concrete may not hold concrete anchor.
- Make sure that the supporting surface will safely support the combined load of the equipment and all attached hardware and components.

- 1** Make sure that wall plate (AA) is level, use it as a template to mark four mounting holes. The top mounting hole should be 2.5" above the desired screen center as shown in figure 1.1 on page 4. Drill four 1/4" (6 mm) dia. holes to a minimum depth of 2.5" (64 mm). Insert anchors (DD) in holes flush with wall as shown (right). Place wall plate over anchors and secure with #14 x 2.5" screws (CC). Level, then tighten all fasteners.

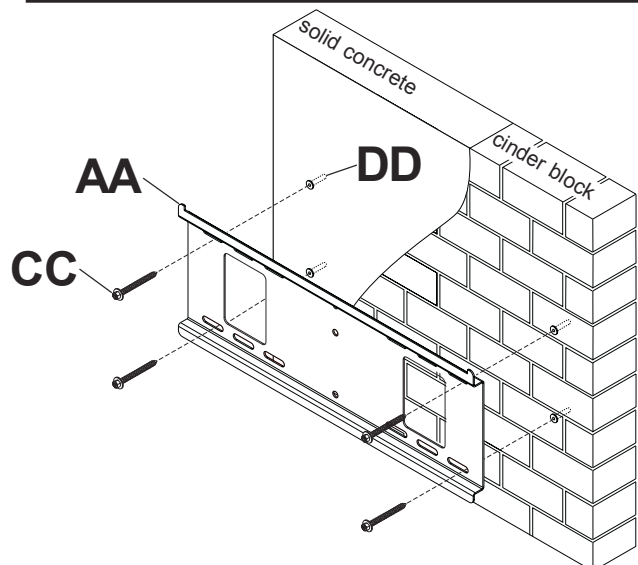
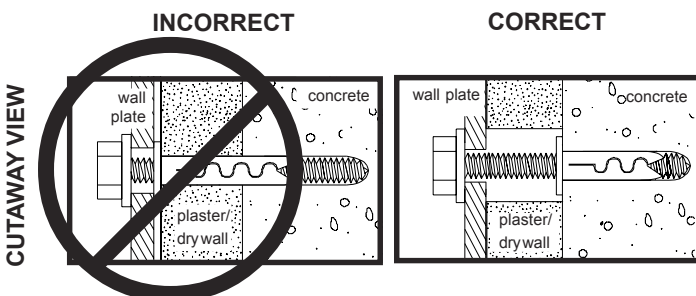


⚠ WARNING

- Tighten screws so that wall plate is firmly attached, but do not overtighten. Overtightening can damage screws, greatly reducing their holding power.
- Never tighten in excess of 80 in. • lb (9 N.M.).

⚠ WARNING

- Always attach concrete expansion anchors directly to load-bearing concrete.
- Never attach concrete expansion anchors to concrete covered with plaster, drywall, or other finishing material. If mounting to concrete surfaces covered with a finishing surface is unavoidable, the finishing surface must be counterbored as shown below. Be sure concrete anchors do not pull away from concrete when tightening screws. If plaster/drywall is thicker than 5/8", custom fasteners must be supplied by installer.

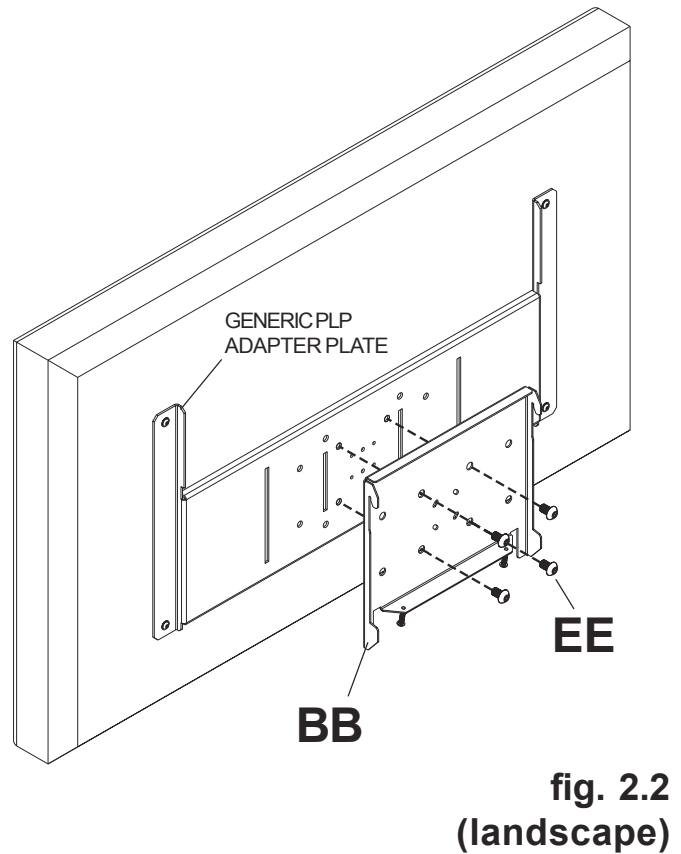
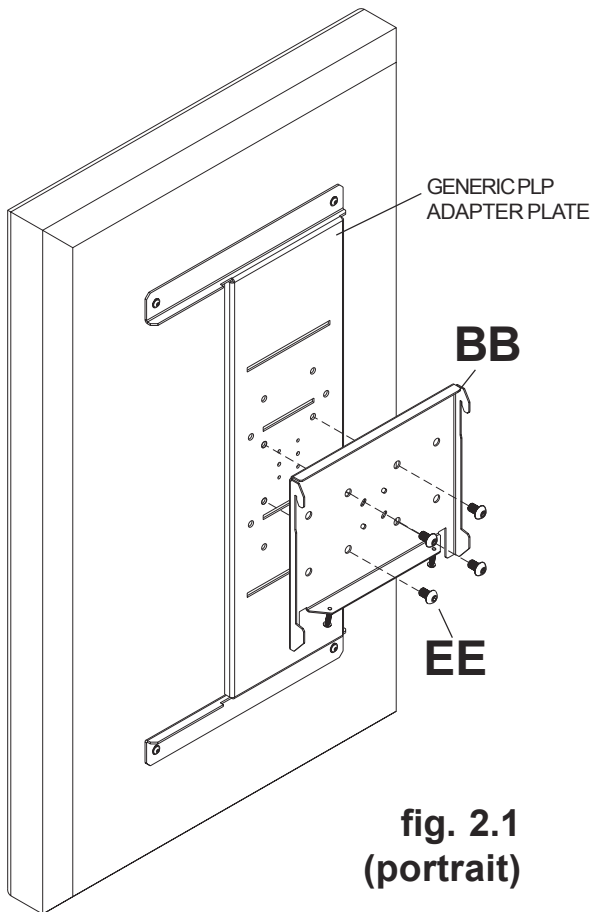


Installing Interface Bracket to PLP Adapter Plate

- 2** To prevent scratching the screen, set a cloth on a flat, level surface that will support the weight of the screen. Place screen face side down. Attach the interface bracket (**BB**) to the PLP adapter plate (sold separately) using four M10 x 15 mm socket head screws (**EE**) as shown in figures 2.1 (portrait) or 2.2 (landscape).

⚠ WARNING

- Tighten screws so adapter brackets are firmly attached. Do not tighten with excessive force. Overtightening can cause stress damage to screws, greatly reducing their holding power and possibly causing screw heads to become detached. Tighten to 40 in. • lb (4.5 N.M.) maximum torque.



Installing Interface Bracket to LC Adapter Plate

- 2** To prevent scratching the screen, set a cloth on a flat, level surface that will support the weight of the screen. Place screen face side down. Attach the interface bracket (**BB**) to the LC adapter plate (sold separately) using four M5 screws provided with plate as shown in figures 2.3 (portrait) or 2.4 (landscape).

⚠ WARNING

- Tighten screws so adapter brackets are firmly attached. Do not tighten with excessive force. Overtightening can cause stress damage to screws, greatly reducing their holding power and possibly causing screw heads to become detached. Tighten to 40 in. • lb (4.5 N.M.) maximum torque.

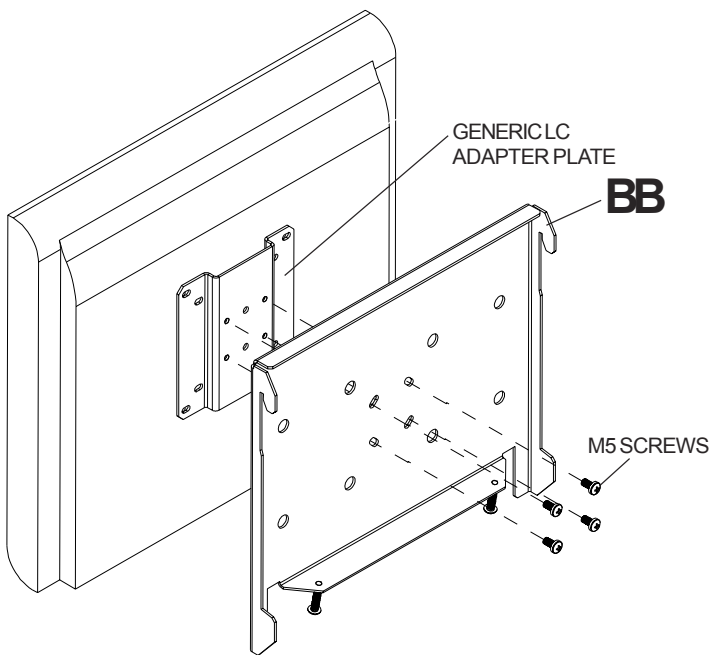


fig. 2.3
(portrait)

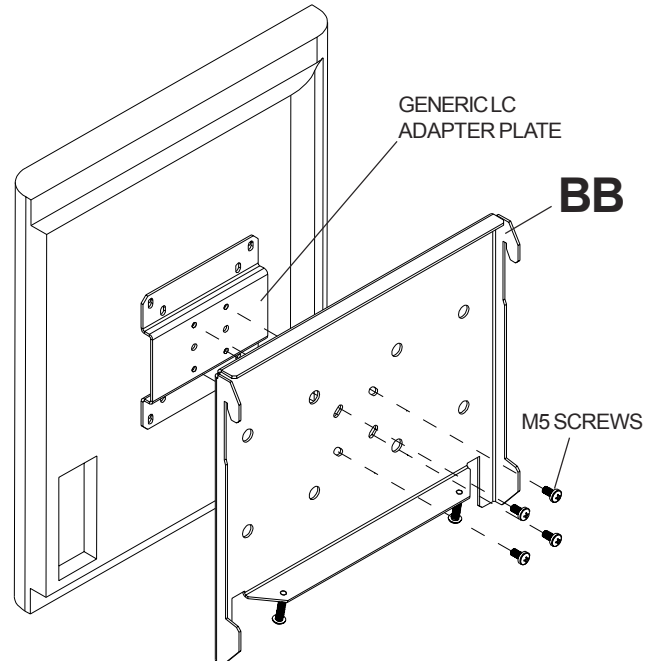


fig. 2.4
(landscape)

Mounting and Removing Flat Panel Screen

3 **Note:** Security screw may need to be loosened to avoid interference with wall plate.

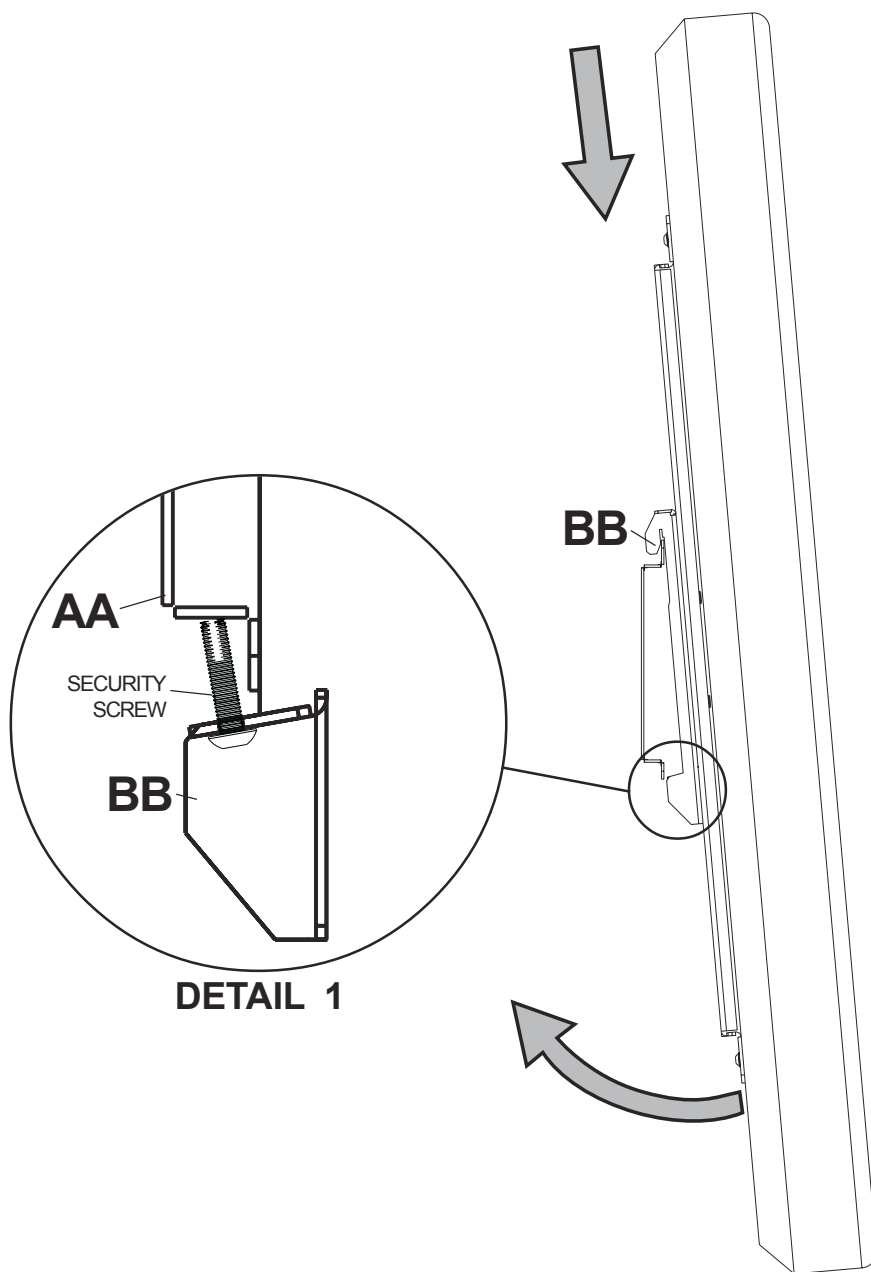
Hook interface bracket (**BB**) onto wall plate (**AA**). Then slowly swing screen in as shown. Turn security screw, using security allen wrench (**FF**), clockwise at least six times to prevent screen from being removed as shown in detail 1. Screen can be adjusted horizontally if desired.

Note: To lock the screen down, tighten security screw to wall plate using security allen wrench as shown in detail 1.

To remove screen from mount, loosen security screw, swing screen away from mount, and lift screen off of mount.

⚠ WARNING

- Always use an assistant or mechanical lifting equipment to safely lift and position the plasma television.



Installation and Assembly - Accessory Kit for Screen Adapter Plate

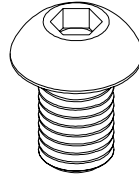
Models: PLP-xxx

IMPORTANT! Read entire instruction sheet before you start installation and assembly.

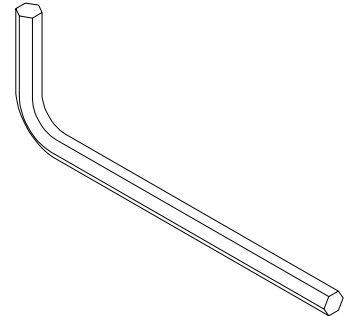
Parts List

| PART # | QTY. | DESCRIPTION |
|-------------|------|-------------------------|
| AA 520-9262 | 4 | M10 x 15mm socket screw |
| BB 560-9716 | 1 | 6mm allen wrench |

AA



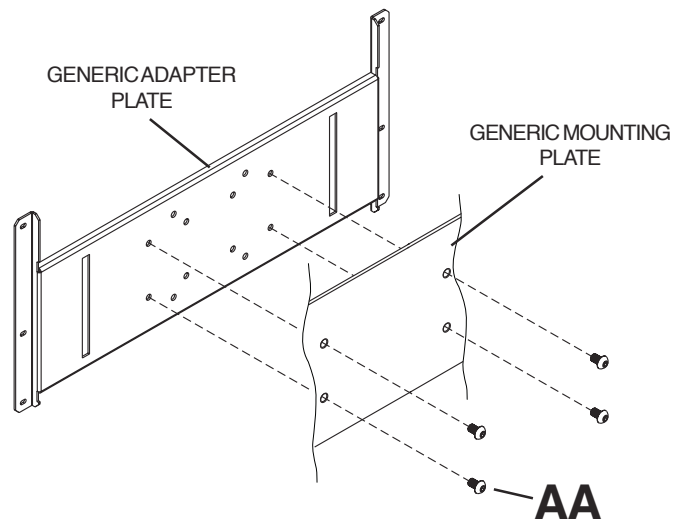
BB



1

Installing Adapter Bracket

Using the hole pattern shown below, attach the adapter plate with four M10 x 15 mm screws (**AA**). Tighten screws using 6 mm allen wrench (**BB**).



Installation and Assembly - Plasma Adapter Bracket for 42" Panasonic® TH-42PX20U/P Plasma Screen

Model: PLP PAN42PX

IMPORTANT! Read instruction sheet before you start installation and assembly.

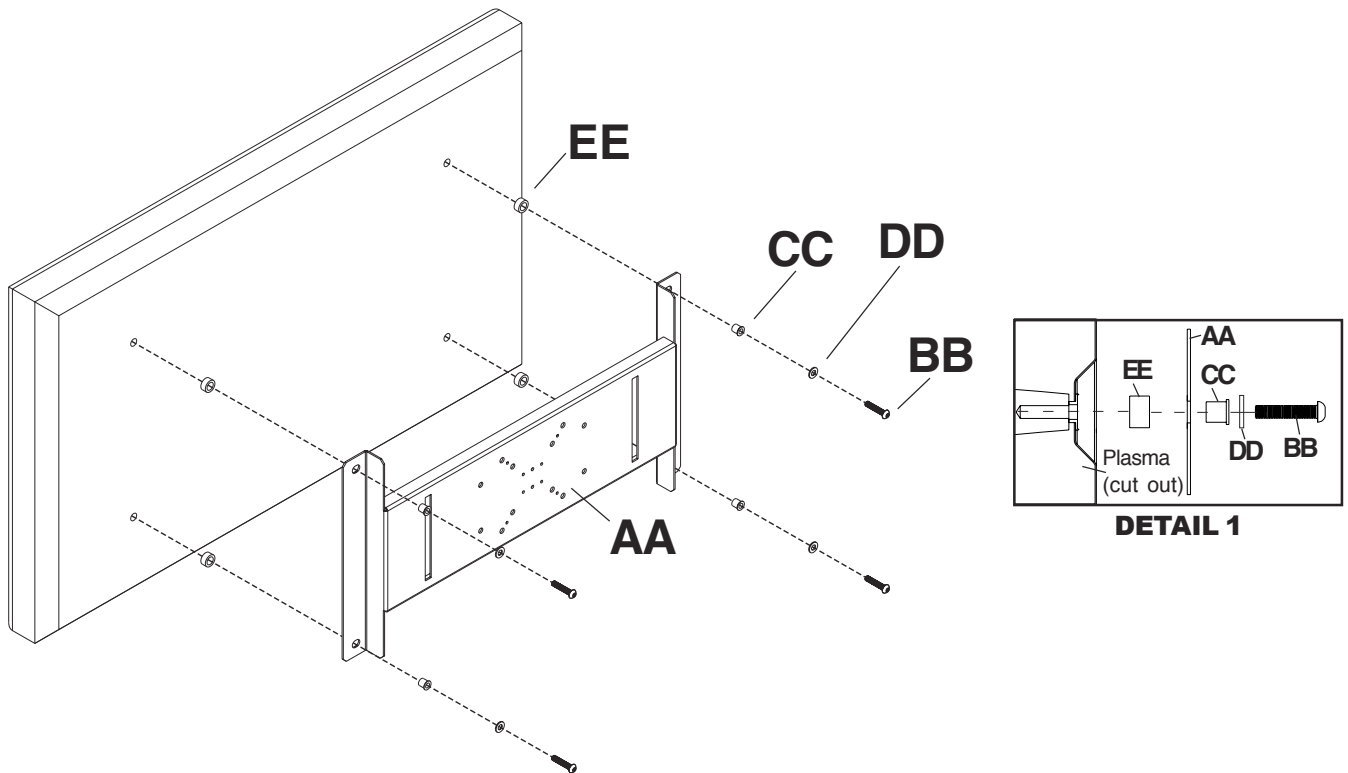
Before you start make sure all parts listed are included with your product.

| Parts List | | | |
|--|------|----------|------------------------------------|
| Description | Qty. | Part # | |
| AA adapter plate | 1 | 201-1114 | Used with specific mounts only |
| BB M8 x 40 mm socket pin screw | 4 | 520-1152 | |
| CC 1/2" OD screw insulator | 4 | 590-1115 | |
| DD 5/16 SAE washer | 4 | 540-9406 | |
| EE .521 ID x .8 OD plastic spacer | 4 | 540-1036 | |
| FF 4 mm security allen wrench | 1 | 560-9646 | |
| GG M5 x 10mm socket pin screw | 4 | 520-1063 | |
| Some parts may appear slightly different than illustrated. | | | |

- Place four .521 ID x .8 OD spacers (**EE**) over mounting holes in back of plasma. Attach adapter plate (**AA**) to back of plasma using four M8 x 40 mm socket pin screws (**BB**), four 5/16 washers (**DD**), and four screw insulators (**CC**) as shown below and in detail 1. Tighten M8 x 40 mm socket pin screws (**BB**) using 4 mm security allen (**FF**).

⚠ WARNING

- Do not overtighten. Overtightening may cause permanent damage to screen. Torque to 26-35 in. / lb. (30-40 kg / cm).



Installing Wall Plate to Metal Stud Walls (Metal Stud Accessory Kit ACC 415 Required)

Models: D-FPF-220, D-FPF-220S, FPMWF-UN,
FPMWF-UN-S, SF 16D, SF 640, SF 640-S,
SF 640P, SF 640P-S

⚠ WARNING

- Drywall must be 1/2" or thicker, and metal stud must be 24 gauge or thicker.
- Make sure that the supporting surface will safely support the combined load of the equipment and all attached hardware and components.

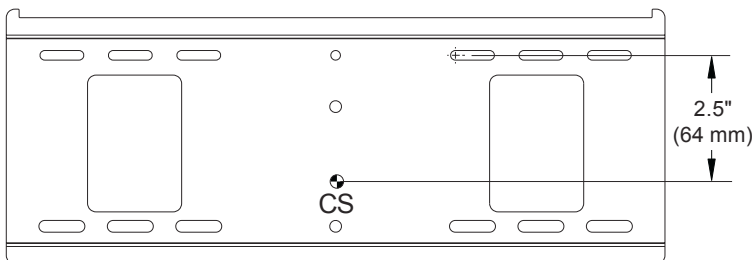
1 Wall plate (**AA**) can be mounted to two studs that are 16" apart. Use a stud finder to locate the edges of the studs. Use of an edge-to-edge stud finder is highly recommended. Based on their edges, draw a vertical line down each stud's center. Place wall plate on wall as a template. The top mounting slots should be 2.5" above the desired screen center as shown in figure 1.1. Level plate, and mark the center of the four mounting holes. Make sure that the mounting holes are on the stud centerlines. Drill four 1/2" holes through drywall and metal studs. **Note:** It may be necessary to drill 5/32" pilot holes prior to drilling 1/2" holes.

Refer to instruction sheet included with Peerless accessory kit ACC 415 for metal studs to install togglers. Loosely fasten mount assembly (**AA**) to wall using four 1/4-20 x 2-1/2" screws as shown in figure 1.2.

Note: For ease of installation, start with the top right screw first and work counterclockwise.

Level, hold, and then tighten all screws.

Skip to step 2 on page 7 of main instruction sheet.



CS = center of screen

fig. 1.1

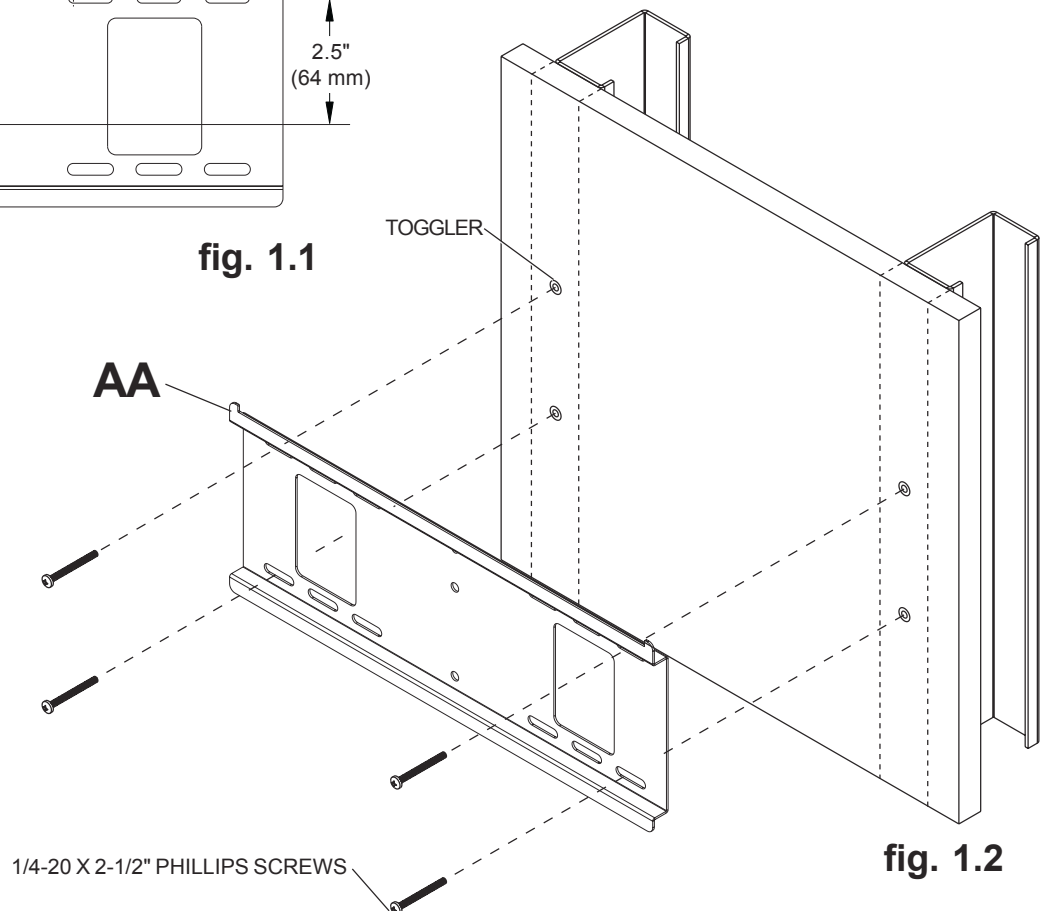


fig. 1.2

Appendix 2 – Technical data sheet for AVT industrial camera

AVT Guppy F-033B / F-033C



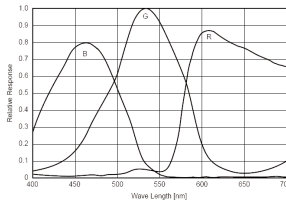
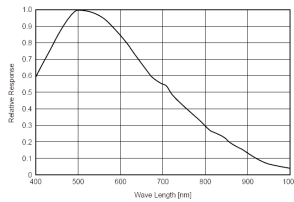
Small - easy - ingenious: Analog goes Guppy.

The AVT Guppy camera family is distinguished by an IEEE 1394 interface and an extremely compact design. It consists of ten different camera variants (each available in b/w and color) and, with a wide variety of sensors and bandwidths, offers the right solution for nearly any conceivable application. The Guppy is available optionally in a casing or board version (upon request) and therefore fits in the smallest spaces. A selection of high-quality, sensitive sensors (CCD, CMOS) help the Guppy provide outstanding image quality and true color. Four additional interlaced versions (EIA, CCIR) make it even more attractive to switch from analog to digital image processing. Due to its modularity and remarkable price/performance ratio, for many applications the Guppy is the ideal way to make the move to digital image processing.

Highlights

- IEEE 1394a
- VGA (656 x 494)
- Up to 58 fps (full resolution)
- Progressive scan CCD, monochrome and color
- True partical scan (higher frame rates by smaller AOI)
- Flexible AOI, flexible speed (full Format_7 support)
- Asynchronous image trigger
- Image preprocessing features:
 - Auto controlled gain, exposure, white balance (separate reference AOI)
 - Programmable LUT
 - And lots more ...
- Smart frame grabber features:
 - Single-shot, multi-shot, free-run
 - 1 prog. input / 3 prog. outputs
 - On-board RS-232 port
 - And lots more ...
- Industry proven and robust housing
- C-Mount /CS-Mount (convertible via adapter)
- OEM board level version, customized housings

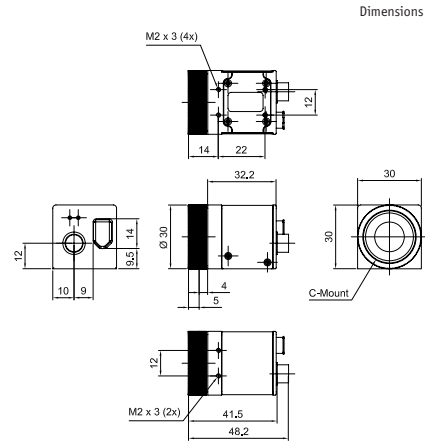
AVT Guppy F-033B / F-033C



Sensor specifications b/w; color (extracted from the data sheet of the sensor - excluding lens and filter)

| Pin | Signal |
|-----|----------------|
| 1 | CameraOut1 |
| 2 | CameraOut2 |
| 3 | CameraOut3 |
| 4 | CameraIn |
| 5 | RxD_RS232 |
| 6 | TxD_RS232 |
| 7 | External Power |
| 8 | GND |

| AOI height / pixel | Frame rate / fps |
|--------------------|------------------|
| 480 | 60 |
| 240 | 100 |
| 120 | 152 |
| 60 | 204 |
| 30 | 245 |



Camera Specifications

| | Guppy F-033B (b/w) | Guppy F-033C (color) |
|----------------------------|---|----------------------|
| Image device | Type 1/3 (diag. 6 mm) progressive scan, SONY CCD | |
| Effective picture elements | 658 (H) x 494 (V) | |
| Picture size | Up to 656 x 494 pixels | |
| Cell size | 7.4 μm x 7.4 μm | |
| Resolution depth | 8 bit (10 bit ADC) | |
| Lens mount | C-Mount /CS-Mount (convertible via adapter) | |
| Digital interface | IEEE 1394 IIDC v. 1.3, single port | |
| Transfer rate | 100 Mbit/s, 200 Mbit/s, 400 Mbit/s | |
| Frame rates | Up to 58 fps (full frames) | |
| Gain control | Manual: 0-24 dB (0.0351 dB/step); auto gain (select. AOI) | |
| Shutter speed | 20 μs...67s; auto shutter (select. AOI) | |
| External trigger shutter | Programmable, trigger-level controlled, bulk mode (1 trigger, n shots), programmable trigger delay | |
| Smart features | AGC (Auto Gain Control), AEC (Auto Exposure Control), only color: AWB (Auto White Balance), LUT, 1 config. input, 3 config. outputs, RS-232 port (serial port, IIDC v. 1.31) | |
| Power requirements | DC 8 V – 36 V via IEEE 1394 cable or 8-pin HIROSE | |
| Power consumption | Less than 2 watt (@ 12V DC) | |
| Dimensions | 48.2 mm x 30 mm x 30 mm (L x W x H), w/o tripod and lens | |
| Mass | < 50 g (without lens) | |
| Operating temperature | +5... + 50° Celsius without condensation | |
| Storage temperature | -10... + 60° Celsius without condensation | |
| Regulations | EN 55022, EN 61000, EN 55024, FCC Class B, DIN ISO 9022, RoHs (2002/95/EC) | |
| Options | Board level version, power out (HIROSE), AVT FirePackage/Direct FirePackage/Fire4Linux | |

Appendix 3 – data sheet for Dino-Lite Pro Microscope



AM411T-Dino-Lite Pro

Built-in 8 white LEDs

1.3M pixels. (SXGA)

USB2.0



The AM411T handheld digital microscope comes with our high quality 1.3 megapixel image sensor that views and takes highly detailed images for professionals. The AM411T handheld digital microscope is featured with the unique MicroTouch snapshot feature. The MicroTouch (touch sensitive static sensor) feature on the handheld digital microscope gives users the option of taking a picture right from the scope itself. The MicroTouch was designed to minimize image blur while taking a picture, but having a hard time reaching the computer. This unit provides variable magnification depending of distance with the highest magnification at over 200X. Options that are also included with the Dino-Lite handheld digital microscope is the DinoCapture imaging software that lets you view, take pictures, and annotate images right from your computer.

| | |
|---|--|
| Model | AM411T-Dino-Lite Pro |
| Basic Specifications | |
| Interface | USB2.0 |
| Product Resolution | 1.3M pixels. (SXGA) |
| Mag Rate | 10x~50x-200x |
| Sensor | Color CMOS |
| Frame rate | up to 30fps |
| Image Format | jpg,bmp,avi |
| Microtouch | Yes |
| LED Switchable (via DinoCapture) | Yes |
| Measurement Function (via DinoCapture) | - |
| Calibration Function (via DinoCapture) | - |
| Software | Windows Vista, XP, 2000, or Windows Server 2003 MAC OS (Microtouch function no supported) |
| Unit Weight | 90(g) |
| Units Dimension | 10cm (H) x 3.2cm (D) |
| Master Box Dimensions | - |

Appendix 4 – cabling diagram

