VPixx Technologies
Vision Science Solutions

VIEWPixx Full (VPX-VPX-2001C)
VIEWPixx Lite (VPX-VPX-2000A)
VIEWPixx /3D Lite (VPX-VPX-2004B)
VIEWPixx /3D Full (VPX-VPX-2005D)

Installation Guide
Version 1.2

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IMPORTANT

VPixx Technologies Inc. reserves the right to modify or otherwise update this document without notice as required by a constantly evolving marketplace, client requests or to adapt to new progress or constraints in engineering or manufacturing technology. The information contained in this document may change without prior notice.

For more information about our company and products, visit our Web site at ***www.vpixx.com***

For information, comments or suggestions, please contact us by e-mail at ***support@vpixx.com***

Our offices are located at:

630 Clairevue West suite 301
Saint-Bruno, Qc
Canada, J3V 6B4

Version History of this document

Version Updated to	Date	Author	Reason
0.1	2019/07/12	P.Kakos	First draft
1.0	2019/07/19	P.Kakos	First release
1.1	2020/04/20	JF Hamelin	Maintenance
1.2	2021/08/18	P.Kakos	Update to Preliminary assembly steps

Document Icons

The use of icons emphasizes helpful, caution or warning notes. Below is a list of the icons available.

Icon	Type	Description
	**Helpful Hint**	*Information to help out during assembly, installation or usage*
	**Caution Notice**	*Important Information to prevent misuse and/or damage to equipment*
	**Warning**	***Critical information to prevent damage to equipment and/or personnel***

Table of Contents

Table of Tables

Table of Figures

Overview

This manual provides safety, hardware, installation, maintenance and specification information for VPixx Technologies Inc.'s VIEWPixx systems, which include:

- VIEWPixx Full (VPX-VPX-2001C)
- VIEWPixx Lite (VPX-VPX-2000A)
- VIEWPixx /3D Full (VPX-VPX-2005D)
- VIEWPixx /3D Lite (VPX-VPX-2004B)

For purposes of clarity in this document, all VIEWPixx systems, except where specifically mentioned, are referred to as *VIEWPixx* or *VIEWPixx system*.

The VIEWPixx is a complete display toolbox which has been conceived specifically to replace CRTs in vision science labs. The VIEWPixx features high-performance industrial LCD glass and a panel controller which has been custom designed to support vision research. Our innovative LED backlight design eliminates the long warmup delay required by CRTs and other LCD backlight technologies. In addition, the VIEWPixx includes an array of peripherals which often need to be synchronized to video during an experiment, including a stereo audio stimulator, a button box port for precise reaction-time measurement, triggers for electrophysiology equipment and a complete analog I/O subsystem. Since the video controller and peripheral control were implemented on the same circuit board, you can successfully synchronize all of your subject I/Os to video refresh with microsecond precision.

As with all VPixx Technologies products, the VIEWPixx is field upgradable. If you require a new feature in order to follow some exciting new direction in your research, we can develop the functionality in our labs, then promptly email you an update for your VIEWPixx.

For technical questions or product support information, do not hesitate to contact the VPixx support team by sending an E-mail at support@vpixx.com or by phone.

By creating your *MyVPixx* account on the VPixx Technologies website, you will have access to additional product documentation, demos, source code examples and the latest firmware and software drivers.

Compliance Information

For European Countries

CE

DECLARATION OF CONFORMITY

Manufacturer's Name: VPixx Technologies Inc.
Manufacturer's Address: 630 Clairevue West suite 301
Saint-Bruno, Qc
Canada, J3V 6B4
Product Name: VIEWPixx Full, VIEWPixx Lite, VIEWPixx /3D Full, VIEWPixx /3D Lite

Part Numbers: VPX-VPX-2001C, VPX-VPX-2000A, VPX-VPX-2005D, VPX-VPX-2004B
Product Options : All
Application of Council Directive:

2014/30/EU	-Electromagnetic Compatibility directive
2015/863/EU	-RoHS directive
2012/19/EU	-Waste Electrical and Electronic Equipment directive

The following harmonised standards have been used:

EN 61326-1:2013 –Electrical equipment for measurement, control and laboratory use.

- **IEC CISPR 11** -Radio frequency disturbance characteristics (Class A)
- **IEC 61000-3-2** -Limits for harmonic current emissions (Class D)
- **IEC 61000-3-3** -Limitation of voltage changes, voltage flicker (≤16A per phase)
- **IEC 61000-4-2** –Electrostatic discharge immunity test (Level 2 contact, air) (Perf Criteria B)
- **IEC 61000-4-3** –Radiated, radio-frequency, electromagnetic field immunity test (Level 2, Perf Criteria A)
- **IEC 61000-4-4** –Electrical fast transient/burst immunity test (Level 2, Perf Criteria B)
- **IEC 61000-4-5** –Surge immunity test (Level 2, Perf Criteria B)
- **IEC 61000-4-6** –Immunity to conducted disturbances, induced by radio-frequency fields (Level 2, Perf Criteria A)
- **IEC 61000-4-8** –Power frequency magnetic field immunity test (Level 2, Perf Criteria A)
- **IEC 61000-4-11** –Voltage dips, short interruptions and voltage variations immunity tests (Perf Criteria B and C)

Supplementary Information:

To remain CE compliant, only CE compliant parts should be used with this product. Maintaining CE compliance also requires proper cable and cabling techniques. VPixx Technologies will not retest systems or components that have been modified by customers.

Signature: 

Printed name: Jean-François Hamelin, Eng Title: Vice President

The following information is only for EU member states:

The mark shown to the left is in compliance with the Waste Electrical and Electronic Equipment directive 2012/19/EU (WEEE). The mark indicates the requirement NOT to dispose of the equipment as unsorted municipal waste. For more information call VPixx Technologies Inc. or email us at support@vpixx.com

For the United States of America

This device complies with part 15 subpart B of FCC rules. Its operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 subpart B of the FCC rules.

For Canada

This Class A digital apparatus complies with Canadian ICES-003.

Declaration of RoHS Compliance

RoHS This product has been designed and manufactured in compliance with Directive **2015/863/EU** of the European Parliament and the Council on restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

WARNING - SAFETY INFORMATION & PRECAUTIONS

Safety precautions

- Use only a power source and connection compatible with this product, as indicated on the label of the power adapter. A power cord is included with the VIEWPixx. If another cord is used, be sure that the power source and connection are appropriate.

- Be sure that the total ampere rating of the products connected to the outlet does not exceed the maximum ampere rating of the electrical outlet, and the total ampere rating of the products connected to the power cord does not exceed the maximum ampere rating of the power cord. Look on the power label to determine the ampere rating (Amps or A) for each device.

- Install the VIEWPixx near a power outlet that you can easily reach. Disconnect it by grasping the plug firmly and pulling it from the outlet. Never disconnect the monitor by pulling directly on the cord.

Hardware and software requirements

Graphics Card

The graphics card should have dual-link DVI outputs, or DisplayPort/Thunderbolt outputs (which can be converted to dual-link DVI through an active dongle).

	*All DisplayPort adaptors are not created equal. The limitation is the 320 MHz video bandwidth which your graphics board can transmit over a dual-link DVI video cable. This is enough bandwidth to generate a full 1920x1200 (or 1080) image at 120 Hz.*

We strongly recommend using the following adaptor, which can be obtained from VPixx Technologies or STARTECH: https://www.startech.com/en-us/audio-video-products/dp2dvid2

USB 2.0

The host computer requires at least one USB 2.0 interface.

Operating System

Your VIEWPixx is compatible with the following OS: MAC OS X, Windows 7 (64bit), Windows 8 (64bit) and Linux.

VIEWPixx installation

Unpack the VIEWPixx and prepare a flat area to assemble the monitor. You will need a flat, soft and protected area for placing the monitor screen-down while preparing it for installation.

	Ensure that while installing/handling the VIEWPixx, ***you do not*** *drop the VIEWPixx, scratch its surface or place equipment or tools directly on the VIEWPixx.*

Prepare the location

Make sure the location where you place the device meets the following requirements:

- The VIEWPixx vent is not blocked
- Enough room remains behind the VIEWPixx to allow for a good airflow
- The VIEWPixx does not rest on an unstable surface
- The VIEWPixx is in a well-ventilated area, away from excessive light, heat, or moisture

	Temperature Consideration*: When choosing the proper location to place your device, it is important to know that LED performance largely depends on the ambient temperature of the operating environment. VPixx Technologies therefore strongly recommends choosing a location having an operating temperature range between 20°C and 28°C (68°F to 82°F). To attain optimal display uniformity, the warm-up time is around 20 minutes. This should be taken into consideration before running experiments or taking photometric measurements.*

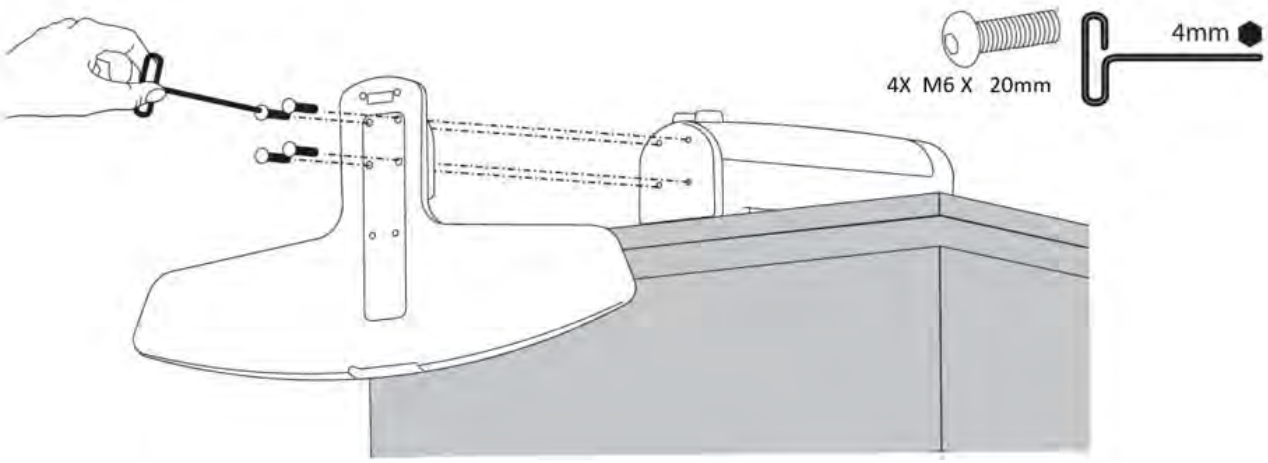
Assemble the required equipment and tools

Your VIEWPixx product should contain the following tools to complete your assembly and installation.

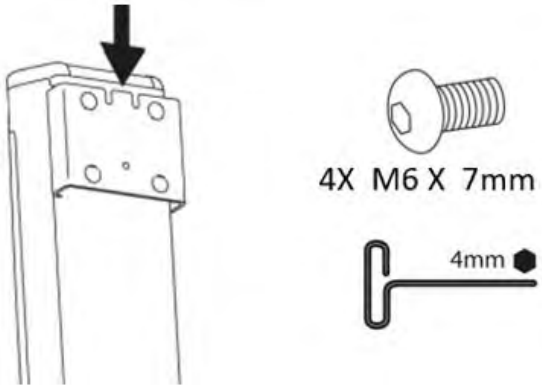
Preliminary Assembly Steps

Start your installation with the following preliminary assembly steps, which each offer a visual representation of the required manipulations and tools.

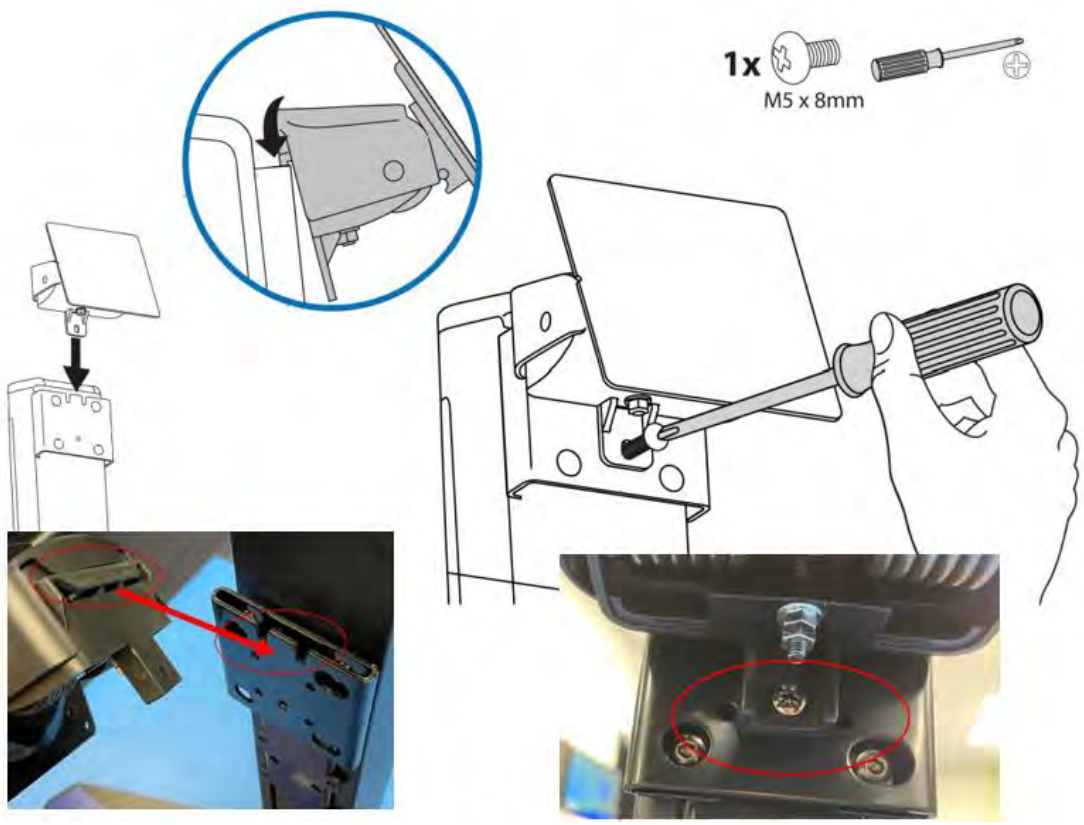
1. Secure the base to the stand.



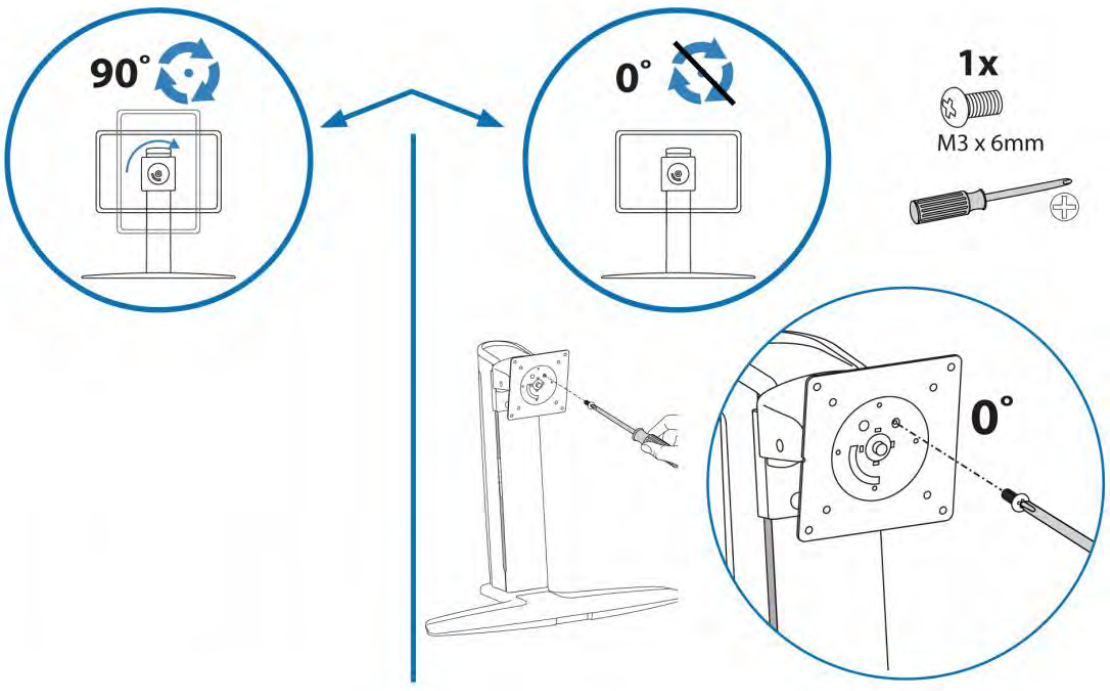
2. Secure the LCD bracket to the stand by first sliding down the bracket over the stand's sliding rail, then use the 4 M6 x 7mm screws to secure it in its desired position. **Ensure that the two grooves are positioned at the top**.



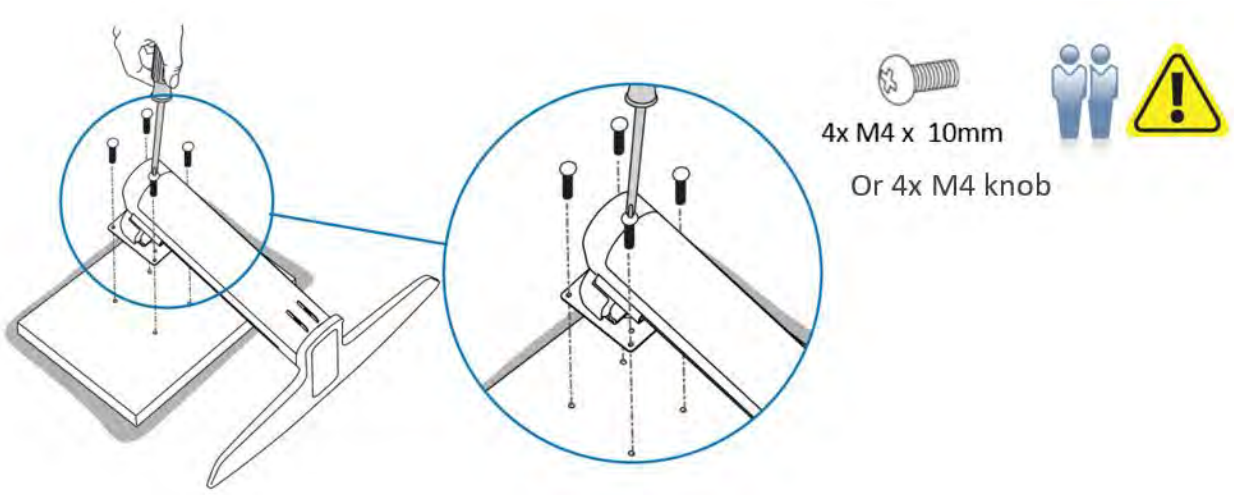
3. Secure the LCD tilt bracket to the LCD bracket using the M5 x 8mm screw and a Phillips screwdriver.



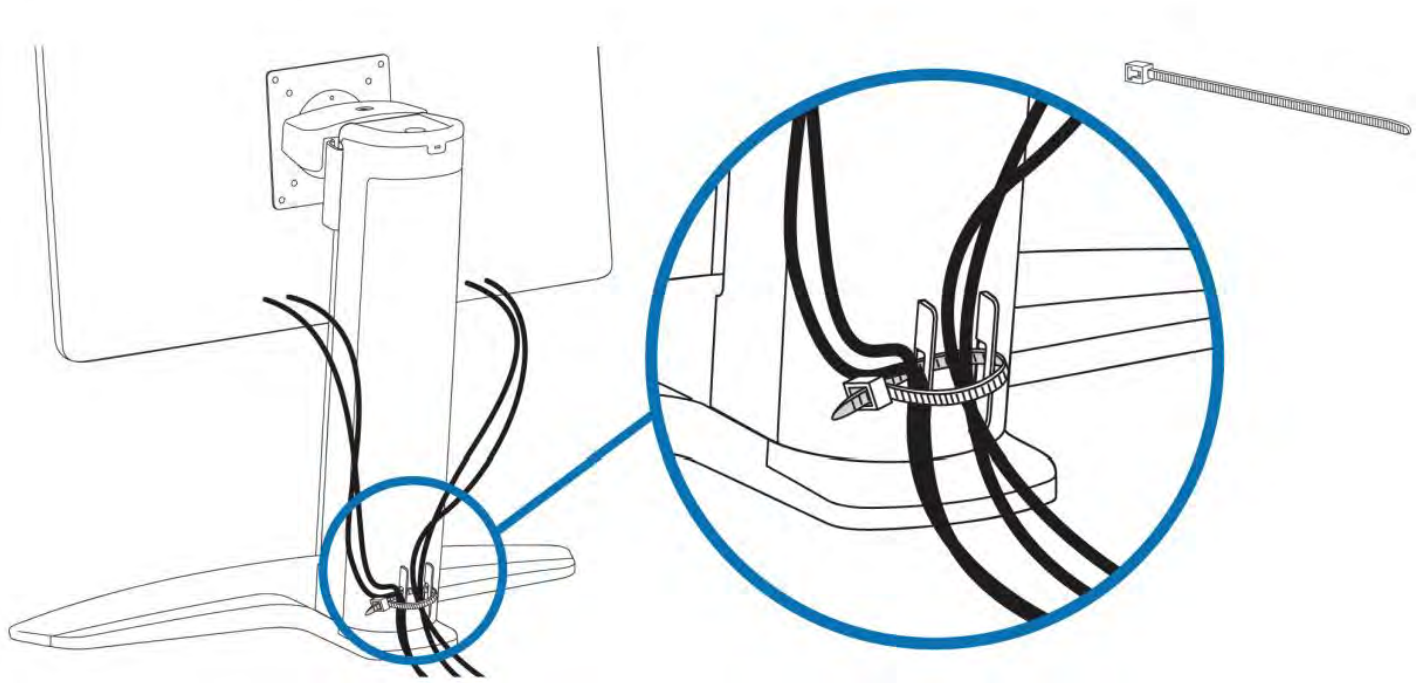
4. (Optional): Use the M3 x 6mm screw to eliminate the possibility of rotating the monitor.



5. (Optional): Use 4x M4 x 10mm (Or 4x M4 knob) to secure the VIEWPixx monitor to the stand.



6. Secure the screen cables to the back of the stand using a plastic tie-wrap.



Cable installation

You can rotate the VIEWPixx as shown below for easy access to all connectors.

Figure 1 VIEWPixx connectors

1. Connect the USB cable between the VIEWPixx and your computer.

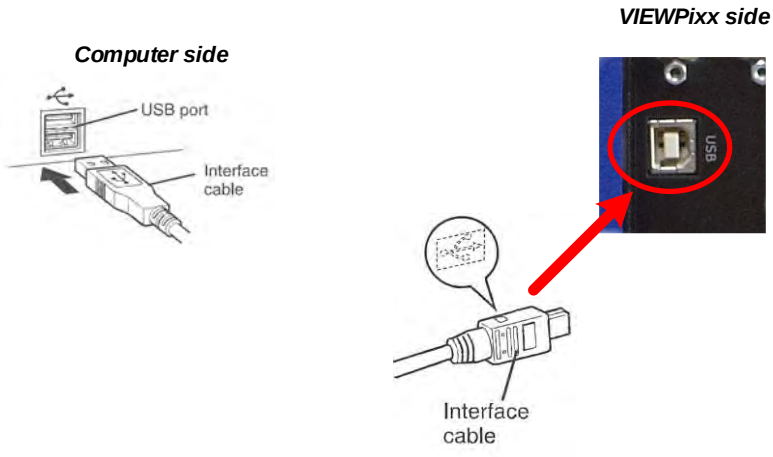


Figure 2 USB connections

2. Connect the DVI cable between the VIEWPixx and your computer. Be sure to use the **DVI IN** connector on the VIEWPixx.

Figure 3 DVI cable connections

3. Connect the VIEWPixx power cable to the wall outlet. This completes the installation procedure.

Device detection

After toggling the VIEWPixx power switch to ON, your computer should detect the VIEWPixx and prompt you for the software/driver installation procedure.

	*For more information on VPixx software tools, please refer to the **VPixx Products Application Guide**.*

I/O connector descriptions

Analog I/O connector

The following table shows the analog I/O pin assignment. If you use the analog breakout cable, refer to the associated user manual interconnections.

***Analog I/O functionalities are available only with VIEWPixx full versions**

Table 1 Analog I/O pin assignment

Pin	Description	Pin	Description
1	ADC0	14	ADC1
2	ADC2	15	ADC3
3	ADC4	16	ADC5
4	ADC6	17	ADC7
5	ADC8	18	ADC9
6	ADC10	19	ADC11
7	ADC12	20	ADC13
8	ADC14	21	ADC15
9	REF0	22	REF1
10	GND	23	+5 VDC **
11	DAC0	24	DAC1
12	DAC2	25	DAC3
13	GND	Shield *	

Connector type: D-SUB, 25 pins
Gender: Female

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.
** Current limited (400mA).

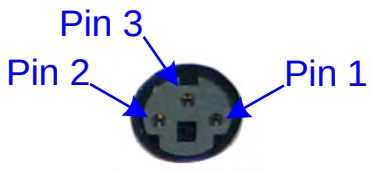
VESA 3D connector

Use this interface when using your VESA 3D glasses. The following table shows the VESA 3D pin assignment.

Table 2 VESA 3D pin assignment

Pin	Description
1	+5 VDC **
2	GND
3	VESA_LR (+5 VDC)
Shield *	

Connector type: Mini-DIN, 3 pins
Gender: Female



* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.
** Current limited (400mA).

Digital output connector

The following table shows the digital output pin assignment.

Table 3 Digital Output pin assignment

Pin	Description	Pin	Description
1	Digital Out 0	14	Digital Out 1
2	Digital Out 2	15	Digital Out 3
3	Digital Out 4	16	Digital Out 5
4	Digital Out 6	17	Digital Out 7
5	Digital Out 8	18	Digital Out 9
6	Digital Out 10	19	Digital Out 11
7	Digital Out 12	20	Digital Out 13
8	Digital Out 14	21	Digital Out 15
9	Digital Out 16	22	Digital Out 17
10	Digital Out 18	23	Digital Out 19
11	Digital Out 20	24	Digital Out 21
12	Digital Out 22	25	Digital Out 23
13	GND	Shield *	

Connector type: D-SUB, 25 pins
Gender: Female

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.

Digital input connector

The following table shows the digital input pin assignment.

Table 4 Digital Input pin assignment

Pin	Description	Pin	Description
1	Digital In 0	14	Digital In 1
2	Digital In 2	15	Digital In 3
3	Digital In 4	16	Digital In 5
4	Digital In 6	17	Digital In 7
5	Digital In 8	18	Digital In 9
6	Digital In 10	19	Digital In 11
7	Digital In 12	20	Digital In 13
8	Digital In 14	21	Digital In 15
9	Digital In 16	22	Digital In 17
10	Digital In 18	23	Digital In 19
11	Digital In 20	24	Digital In 21
12	Digital In 22	25	Digital In 23
13	GND	Shield *	

Connector type: D-SUB, 25 pins
Gender: Female

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.

Audio In / MIC In / Audio Out

Audio equipment may be connected through these jacks with standard 1/8” (3.5mm) stereo plugs. The following table shows the audio pin assignment for each jack.

***Audio IN, MIC In and Audio Out functionalities are available only with VIEWPixx full versions**

Audio In

Table 5 Audio In pin assignment

Pin	Description
TIP	Audio In left
Ring	Audio In right
Sleeve	GND
Shield *	

Connector type: Stereo 1/8” (3.5mm)
Gender: Jack (female)

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.

Audio Out

Table 6 Audio Out pin assignment

Pin	Description
TIP	Audio Out left
Ring	Audio Out right
Sleeve	GND
Shield *	

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.

MIC In

Table 7 MIC IN pin assignment

Pin	Description
TIP	MIC In left
Ring	MIC In right
Sleeve	GND
Shield *	

* Shield is tied to the GND by a 0 Ohm resistor inside the VIEWPixx system.

Software installation instructions

For information on how to install your software, please refer to the

Application Guide for VPixx Products

Maintenance

Cleaning the VIEWPixx

Clean the surface of your VIEWPixx as required and depending on usage. Turn your monitor off and unplug the power cord. Clean the monitor surface with a lint-free, non-abrasive cloth. Stubborn stains may be removed with a cloth dampened with mild cleaner. Avoid using a cleaner containing alcohol or acetone. Use a cleaner intended for use with the monitor. Never spray cleaner directly on the screen, as it may drip inside the monitor and cause an electric shock.

	***Do not apply pressure to, or rub, the sensitive product surface.***

	***Do not use cleaners that contain any petroleum-based materials such as benzene, thinner, acetone, alcohol or any volatile substance to clean the LCD monitor screen***

General specifications for VIEWPixx system Full (VPX-VPX-2001C) and Lite (VPX-VPX-2000A)

Dimensions

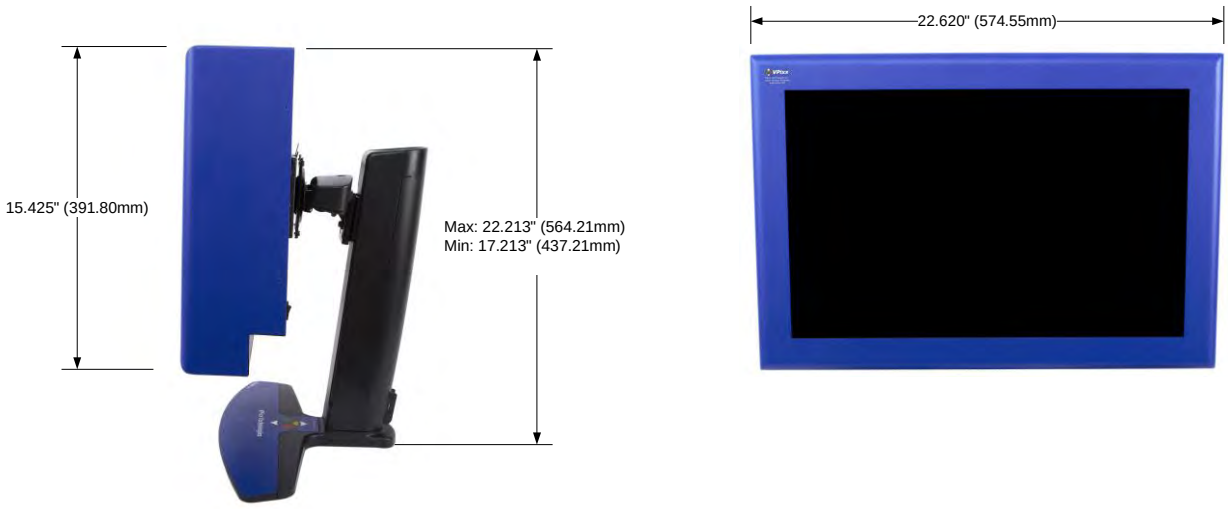


Figure 4 VIEWPixx dimensions

LCD specifications

- Display resolution: 1920(H) x 1200(V) pixels
- 22.5-inch display size (diagonal)
- Pixel pitch: 0.252(H) x 0.252(V) mm
- Pixel arrangement: RGB (Red dot, Green dot, Blue dot) vertical strip
- Active matrix LCD
- 12-bit resolution on each of the RGB channels
- 100 Hz to 120 Hz refresh rate with zero latency stimulus presentation
- 60 Hz to 100 Hz refresh rate with internal frame buffering
- Pixel response time :
    - 1 ms typical in scanning backlight mode
    - 7 ms typical in standard backlight mode
- Luminance:
    - 100 cd/m^2 in scanning backlight mode
    - 250 cd/m^2 in standard backlight mode

- Uniformity: 95% over 95% of display area
- Contrast ratio: Typical 800:1
- Viewing angle: 176° (Horizontal), 176° (Vertical)
- Polarizer surface: Antiglare

Backlight specifications

- Scanning LED backlight
- Direct RGB LED array
- Wide gamut LED
- Factory white point D65

Video processing

- Video input: 1920 x 1200 pixels, 60 Hz to 120 Hz, 24 bits (Dual link DVI)
- Deterministic timing between reception of video signal and update of display pixels
- Completely bypasses all image processing “enhancements” prevalent in standard consumer LCD panels
- Multiple displays can be synchronized, showing copies or subsets of original video

Analog to digital converter

- Number of channels: 16 (or 8 differential), on DB-25 connector
- Converter resolution: 16 bits
- Maximum sampling rate: 200 kSPS per channel
- Frequency programming modes:
    - Samples per second
    - Samples per video frame
    - Nanoseconds per sample
- Simultaneous sampling across all channels
- Input range: ±10 V
- Input impedance: $1.6*10^8$ Ω //3 pF
- Absolute maximum input tolerance: ±12 V

***ADC functionalities are available only with VIEWPixx full version (VPX-VPX-2001C)**

Digital to analog converter

- Number of channels: 4 on DB-25 connector
- Converter resolution: 16 bits
- Maximum sampling rate: 1 MSPS per channel
- Frequency programming modes:
    - Samples per second
    - Samples per video frame
    - Nanoseconds per sample
- Simultaneous output updates
- Output range: ±10 V
- Drive capability: ±25 mA, 250 mW per channel

***DAC functionalities are available only with VIEWPixx full version (VPX-VPX-2001C)**

Audio CODEC

- Audio line in, microphone in, speaker out, on 3.5 mm jacks

- Stereo microphone input amplifier resistance: 20 kΩ
- Microphone sampling rate: 96 kHz
- Programmable microphone bias voltage range: 2.0 V to 3.1 V
- Stereo DAC sampling rate 96 kHz

***Audio CODEC functionalities are available only with VIEWPixx full version (VPX-VPX-2001C)**

Digital input

- Number of digital inputs: 24 on db-25 connector
- Input termination: >20 kΩ pullup to 3.3 V
- Input tolerance: 5 V

Digital output

- Number of digital outputs: 24 on db-25 connector
- Output drive stage: 5 V through 25 Ω series resistor
- Maximum output current:
    - Source: 15 mA
    - Sink: 12 mA

Software

Software support includes a low-level ANSI C API as well as Psychtoolbox MATLAB / Octave and Python libraries for Mac OS X, Windows 7, Windows 8, Windows 10 and Linux. In addition, the VIEWPixx is directly supported by the VPixx high-level application.

Connectivity

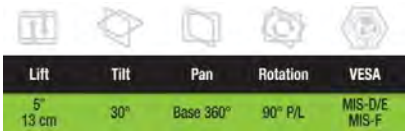
- 1x USB 2.0 type B
- 3x DB-25 female
- 3x 3.5mm stereo jacks
- 1x Dual Link DVI Input
- 1x Dual Link DVI Output
- 1x VESA 3D for shutter goggles
- 1x Power receptacle 6pos

Power specification

- Power consumption: 180 W
- Input voltage: 48 Vdc – 3.75 A
- International AC adaptor input: 90 Vac – 264 Vac (47 Hz – 63 Hz)

VIEWPixx stand

- Mounting standards: VESA MIS-D/E, MIS-F
- Hole pattern: 100 x 100 mm & 75 x 75 mm



Lift	Tilt	Pan	Rotation	VESA
5" 13 cm	30°	Base 360°	90° P/L	MIS-D/E MIS-F

General specifications for VIEWPixx /3D Full (VPX-VPX-2005D) and Lite (VPX-VPX-2004B)

Dimensions

Same as VIEWPixx system Full and Lite.

LCD specifications

- Display resolution: 1920(H) x 1080(V) pixels
- 24-inch display size (diagonal)
- Pixel pitch: 0.2715(H) x 0.2715(V) mm
- Pixel arrangement: RGB (Red dot, Green dot, Blue dot) vertical strip
- TFT LCD
- 10-bit resolution on each of the RGB channels
- 100 Hz to 120 Hz refresh rate with zero latency stimulus presentation
- 60 Hz to 100 Hz refresh rate with internal frame buffering
- Pixel response time :
    - 1 ms typical in scanning backlight mode
    - 2 ms typical in standard backlight mode
- Luminance:
    - 100 cd/m^2 in scanning backlight mode
    - 250 cd/m^2 in standard backlight mode
- Uniformity: 95% over 95% of display area
- Contrast ratio: Typical 1000:1
- Viewing angle: 170° (Horizontal), 160° (Vertical)
- Polarizer surface: Antiglare

Backlight specifications

- Scanning LED backlight
- Direct RGB LED array
- Wide gamut LED
- Factory white point D65

Video processing

- Video input: 1920 x 1080 pixels, 60 Hz to 120 Hz, 24 bits (Dual link DVI)
- Deterministic timing between reception of video signal and update of display pixels
- Completely bypasses all image processing “enhancements” prevalent in standard consumer LCD panels
- Multiple displays can be synchronized, showing copies or subsets of the original video

Analog to digital converter

- Number of channels: 16 (or 8 differential), on DB-25 connector
- Converter resolution: 16 bits
- Maximum sampling rate: 200 kSPS per channel

- Frequency programming modes:
    - Samples per second
    - Samples per video frame
    - Nanoseconds per sample
- Simultaneous sampling across all channels
- Input range: ±10 V
- Input impedance: 1.6*10 Ω^8 //3 pF
- Absolute maximum input tolerance: ±12 V

***ADC functionalities are available only with VIEWPixx /3D full version (VPX-VPX-2005D)**

Digital to analog converter

- Number of channels: 4 on DB-25 connector
- Converter resolution: 16 bits
- Maximum sampling rate: 1 MSPS per channel
- Frequency programming modes:
    - Samples per second
    - Samples per video frame
    - Nanoseconds per sample
- Simultaneous output updates
- Output range: ±10 V
- Drive capability: ±25 mA, 250 mW per channel

***DAC functionalities are available only with VIEWPixx /3D full version (VPX-VPX-2005D)**

Audio CODEC

- Audio line in, microphone in, speaker out, on 3.5 mm jacks
- Stereo microphone input amplifier resistance: 20 kΩ
- Microphone sampling rate: 96 kHz
- Programmable microphone bias voltage range: 2.0 V to 3.1 V
- Stereo DAC sampling rate 96 kHz

***Audio CODEC functionalities are available only with VIEWPixx /3D full version (VPX-VPX-2005D)**

Digital input

- Number of digital inputs: 24 on db-25 connector
- Input termination: >20 kΩ pullup to 3.3 V
- Input tolerance: 5 V

Digital output

- Number of digital outputs: 24 on db-25 connector
- Output drive stage: 5 V through 25 Ω series resistor
- Maximum output current:
    - Source: 15 mA
    - Sink: 12 mA

Software

Software support includes a low-level ANSI C API as well as Psychtoolbox MATLAB / Octave and Python libraries for Mac OS X, Windows 7, Windows 8, Windows 10 and Linux. In addition, the VIEWPixx /3D is directly supported by the VPixx high-level application.

Connectivity

- 1x USB 2.0 type B
- 3x DB-25 female
- 3x 3.5 mm stereo jacks
- 1x Dual Link DVI Input
- 1x Dual Link DVI Output
- 1x VESA 3D for shutter goggles
- 1x Power receptacle 6pos

Power specification

- Power consumption: 180 W
- Input voltage: 48 Vdc – 3.75 A
- International AC adaptor input: 90 Vac – 264 Vac (47 Hz – 63 Hz)

VIEWPixx /3D stand

- Mounting standards: VESA MIS-D/E, MIS-F
- Hole pattern: 100 x 100 mm & 75 x 75 mm

Lift	Tilt	Pan	Rotation	VESA
5″ 13 cm	30°	Base 360°	90° P/L	MIS-D/E MIS-F

Warranty

The VIEWPixx is warranted against manufacturing defects in materials and workmanship for two years for parts and labor from the date of purchase.

VPixx Technologies Inc.
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