# M-Series
# Industrial Flat Panel Monitor

# User's Guide

**Nematron**

## Revision List

| Revision Number | Description of Change | Release Date |
|---|---|---|
| A | Initial Release | 9-2006 |
| B | Added Windows Vista driver to list of supported drivers, Added notes to driver list, Changed Logo, Corrected H X W Reversals on page 5 | 4-2007 |
| C | Added DVI functionality, UL Hazardous Locations Notes and Warnings | 6-2008 |
| D | Replaced "Power" with "Display Power" on button description, added IEC 60950-1& RoHS to Agency Approvals, Added Input Source Select instructions, Changed input power to 25 Watts and updated display specifications. | 8-2008 |
| E | Revision for Field Wiring Requirements | 5-2010 |
| F | Combined all monitors into one, Added –EN options and M1200 | 9-2010 |
| G | Added M2200WT | 12-2011 |
| H | UL Required changes for UL 1604 to ANSI/ISA 12.12.01-2012 Conversion | 9-2012 |
| J (I not used)I | Added ATEX Zone 2 and M1500SRT Information | 11-2014 |

Nematron reserves the right to make changes in specifications described herein at any time without notice in order to improve design and reliability. Nematron does not assume any responsibility for the use of any circuitry described; no circuit patent licenses are implied. Nematron assumes no responsibility for damage caused by misuse or improper use of its products.

## WARRANTY

Nematron warrants to Customer that the Products will be free from defects in material and workmanship under normal use and service for a period of two years from date of invoice. Customer's exclusive remedy for breach of this warranty is that Nematron will either (i) repair or replace, at its option, any Product which fails during the warranty period because of such defect (if Customer promptly reported the failure to Nematron in writing) or, (ii) if Nematron is unable to repair or replace, Nematron will refund the purchase price of the Product upon its return to Nematron. This warranty does not apply to any Product which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design or construction, or which has been serviced by anyone other than Nematron. The warranty set forth herein is in lieu of, and exclusive of, all other warranties, express or implied.

# Chapter 1 - Introduction

The M-Series are high performance TFT flat panel monitors specifically designed for harsh industrial environments including Class I & II, Division 2 Hazardous Locations. The monitors accept standard analog VGA or Digital DVI inputs. They can display VESA video modes up to 1680 x 1050 at 75Hz with 16 million colors. An optional 5-wire analog touch screen is available that offers both RS-232 and USB interface capability. The monitor is housed in a heavy duty steel chassis with a powder coated machined aluminum bezel. The monitor is certified to NEMA 4/4X/12 standards, is UL/CUL listed, meets CE requirements and is RoHS compliant. Panel mounting is simplified using convenient mounting clips instead of conventional studs. Options include: a 5-wire analog resistive touch screen or clear Lexan window, a 304 stainless steel bezel, rack mount bezel (M1900 only), enclosed versions (M1500 and M1900 only), and 24 volt DC input power supply (not available on the enclosed options). All monitors are shipped with a power input wiring receptacle, VGA cable, touch screen cable (if equipped), mounting hardware, manual and driver software.

## Features

- UL 508 and ANSI/ISA 12.12.01 listed for Hazardous Locations: Class I, Division 2, Groups A, B, C, D and Class II, Division 2, Groups F and G, Class III hazardous locations when mounted in a NEMA Type 1, 4, 4x, or 12 enclosure (does not include –EN options, -EN units only have UL 508 approvals only)
- ATEX Zone 2/22 optional configurations when installed in an ATEX IP54 (or better) enclosure (N/A to Enclosed Options)
- NEMA 4/4X/12 & IP66 front bezel (does not include –EN or –RM options)
- 2-Year warranty
- Integral 100 -240 VAC power supply
- Simplified installation with no studs
- Thin design – Only 2.7" behind bezel
- Accepts Analog Video or Digital Video (DVI) inputs
- VESA compliant – all modes up to WSXGA+, 75Hz
- Optional 5-wire resistive touch screen with both RS-232 and USB interface
- Optional 15" Sunlight Readable (M1500SR) with front manual and automatic brightness control
- Optional 304 stainless steel front bezel
- Optional 24 VDC input power
- Optional Rack Mount front bezel on the M1900 (19")
- Optional Rear NEMA 1 Enclosure (-EN)

## Supported PC Video Modes

The M-Series monitors support the following video modes:

*Note:* The highlighted PC display modes produce the best image quality on the size monitors as follows:

[ yellow ] - M1200

[ light blue ] - M1500 & M1500SR

[ orange ] - M1700 & M1900

[ blue-gray ] - M220W

| Mode |
|---|
| 640 x 350 @ 70Hz |
| 640 x 400 @ 70Hz |
| 720 x 400 @ 70Hz |
| 640 x 480 @ 60Hz |
| 640 x 480 @ 72Hz |
| 640 x 480 @ 75Hz |
| 800 x 600 @ 56HZ |
| 800 x 600 @ 60Hz |
| 800 x 600 @ 72Hz |
| 800 x 600 @ 75Hz |
| 1024 x 768 @ 60Hz |
| 1024 x 768 @ 70Hz |
| 1024 x 768 @ 75Hz |
| 1280 x1024 @ 60Hz |
| 1280 x 1024 @  75Hz |
| 1600 x 1050 @ 75Hz |

# Specifications

**Front Panels**

The M-Series monitors have NEMA 4/4X/12 and IP66 sealed front panels when mounted in an appropriate NEMA rated enclosure. See Chapter 2 for more details on installation and selection of an appropriate enclosure.  All five sizes have very similar front panels with different dimensions.
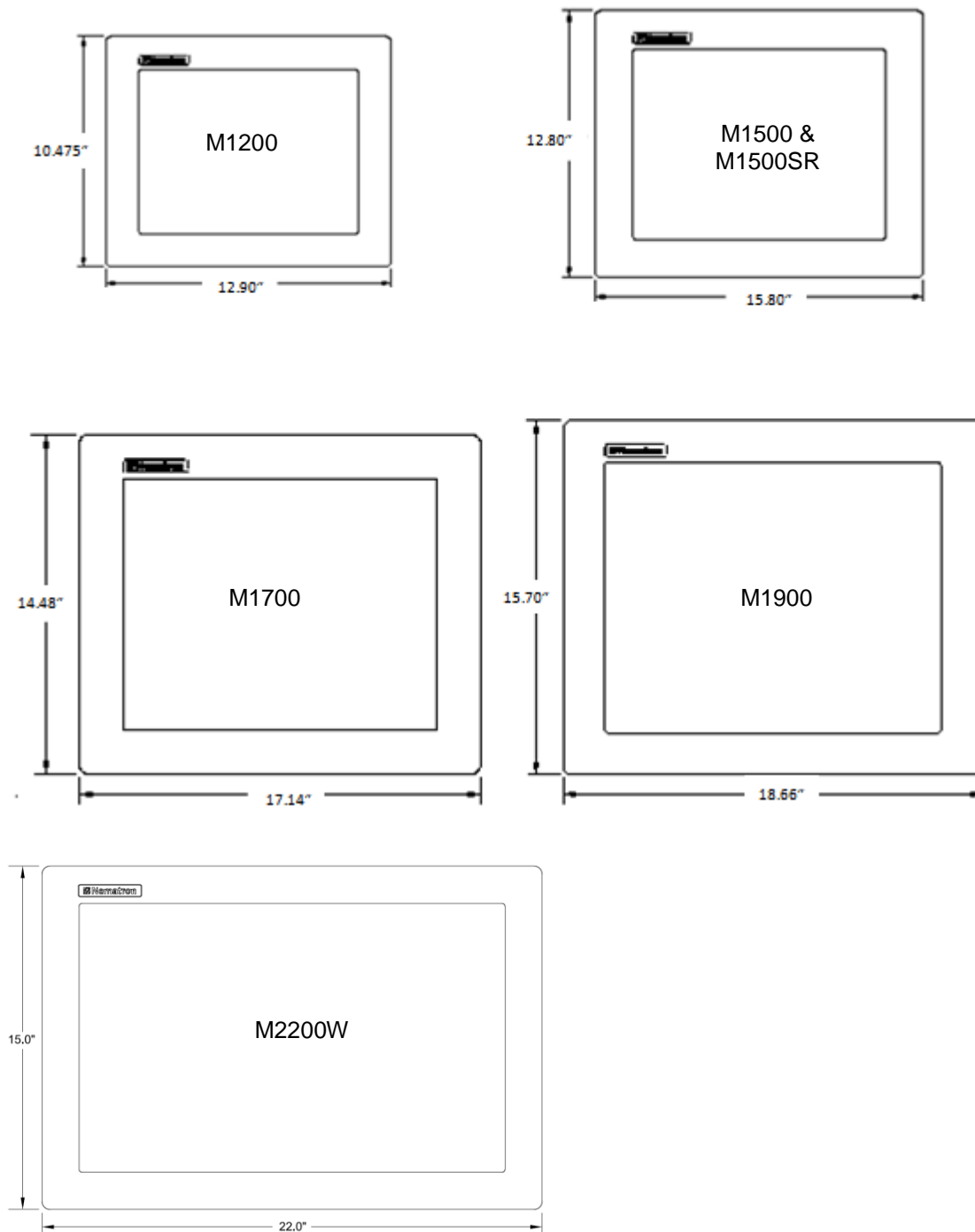
M1200
10.475"
12.90"

M1500 & M1500SR
12.80"
15.80"

M1700
14.48"
17.14"

M1900
15.70"
18.66"

M2200W
15.0"
22.0"

**Figure 1.0: M-Series Front Panel Comparison**

The standard front panels are powder coated aluminum. The optional Stainless Steel front panel is type 304 and will not contain a logo pocket or logo on the front. The window area is clear polycarbonate when ordered without a touchscreen (N/A to ATEX Zone 2/22 configurations). The touchscreen option is heat annealed strengthened glass covered by a polyester overlay. The polyester overlay has better resistance to chemicals than the polycarbonate window. Depending on the chemicals involved in your application consideration should be given to choosing the proper window material. In addition there is a Rack Mount front panel option for the M1900 (19" unit) only. This front panel is powder coated aluminum and is 9U high with four rack mount spaced counter-bored mounting holes on each side of the panel. This panel is not NEMA sealed when installed.

**DISPLAY**

| | M1200 | M1500 & M1500SR | M1700 | M1900 | M2200W |
|---|---|---|---|---|---|
| Display Diagonal | 12.1" (307.34mm) | 15.0" (381.0mm) | 17.0" (431.8mm) | 19.0" (482.6mm) | 22.0" (558.8mm) |
| Display Size (Active Area HxV) | 9.69" x 7.26" (246.0mm x 184.5mm) | 11.97" x 8.98" (304.0mm x 228.1mm) | 13.30" x 10.64" (337.8mm x 270.3mm) | 14.82" x 11.85" (376.4mm x 301.0mm) | 18.65" x 11.65" (360.68mm x 538.48mm) |
| Native Resolution | SVGA, 800 x 600 | XGA, 1024 x 768 | SXGA, 1280 x 1024 | SXGA, 1280 x 1024 | WSXGA+ 1680 x 1050 |
| Displayable Colors | 16M | 16M | 16M | 16M | 16M |
| Brightness, Typical | 450 Nit | 400 Nit (1500 Nit min M1500SR) | 350 Nit | 300 Nit | 300 Nit |
| Contrast Ratio, Typical | 600:1 | 600:1 | 1000:1 | 2000:1 | 1000:1 |
| Horizon/Vertical View Angle, CR>5, Typical | 140°/120° | 140°/120° (160°/160° M1500SR) | 170°/170° | 178°/178° | 178°/178° |
| Backlight Life, Typical | 50,000 hrs | 50,000 hrs | 50,000 hrs | 50,000 hrs | 50,000 hrs |

**TOUCH SCREEN (Optional)**

| Touch Screen Technology | 5- Wire Analog Resistive |
|---|---|
| Interface | RS-232 or USB |
| Positional Accuracy (Maximum Error) | 0.18" (0.19" M1900) <br> 4.57mm (4.83mm M1900) |
| Positional Accuracy (Standard Deviation of Error) | < 0.08" (< 2.0 mm) |
| Expected Life | >35,000,000 Activations |

**PHYSICAL**

| | M1200 | M1500 & M1500SR | *M1700* | M1900 | M2200W |
|---|---|---|---|---|---|
| Over All Dimensions (H x W x D) | 10.475” x 12.9” x 2.65” (266.1mm x 327.2mm x 67.3mm) | 12.80” x 15.80” x 2.65” (325.1mm x 401.3mm x 67.3mm) | *14.48” x 17.14” x 2.85” (367.8mm x 442.0mm x 72.4mm)* | 15.70” x 18.66” x 2.95” (398.8mm x 474.0mm x 75.0mm) | 15.00” x 22.0” x 2.95 (381mm x 558.8mm x 75.0mm) |
| Panel Mounting Depth | 2.4” (61.0mm) | 2.4” (61.0mm) | *2.6” (66.0mm)* | 2.7” (68.6mm) | 2.7” (68.6mm) |
| Cutout Dimensions (H x W) | 9.68” x 12.10” (245.9mm x 307.3mm) | 12.00” x 15.00” (305mm x 381mm) | *13.70” x 16.35” (348mm x 415.3mm)* | 14.90” x 17.75” (378.5mm x 450.9mm) | 14.2” x 21.2” 9360.68mm x 538.48mm) |
| Weight | 9.5 lbs (4.31kg) | 14.0 lbs (6.35kg) | *18.5 lbs (8.39kg)* | 22.5 lbs (10.21kg) | 23.0 lbs (10.43kg) |
| Shipping Weight | 14.0 lbs (5.89kg) | 19.0 lbs (8.62kg) | *23.5 lbs (10.66kg)* | 27.5 lbs (12.47kg) | 30.0 lbs (13.60kg) |
| Option Weight (-SS) | +2.5 lbs (1.13kg) | +3.5 lbs (1.58kg) | *+3.75 lbs (1.70kg)* | +4.0 lbs (1.81kg) | N/A |

**ELECTRICAL**

| AC Input Voltage | 100 – 240 VAC, 50/60 Hz |
|---|---|
| AC Input Current | M1200 & M1500 – 0.5 A Maximum<br>M1500SR – 0.8 A Maximum<br>M1700 & M1900 - 1.0 A Maximum<br>M2200W – 1.0 A Maximum |
| DC Input Voltage (Optional) | 18 – 36 VDC |
| DC Input Current (Optional) | M1200, M1500, M1700, & M1900 - 2.0 A Max<br>M1500SR – 2.75 A Max<br>M2200W – 4.5 A Max |
| Input Power | M1200/M1500 - 25 W Typical*<br>M1500SR – 50 W Typical*<br>M1700 – 30 W Typical*<br>M1900 – 35 W Typical*<br>M2200W – 60 W Typical* |

* Typical Power is measured without any additional I/O or expansion options.  Any additional I/O installed during application can increase this value.

**ENVIROMENTAL**

| Operating Temperature | 0°C to 55°C |
|---|---|
| Non-Operating Temperature | -20°C to 60°C |
| Operating & Non-Operating Humidity | 20% to 80% RH, non-condensing |
| Operating Shock* | 15g peak acceleration, 11msec |
| Non-Operating Shock | 30g peak acceleration 11msec |
| Operating Vibration (5-2000 Hz) [1] | 0.006" peak to peak displacement, 1g maximum acceleration |
| Non-Operating Vibration (5-2000 Hz) [1] | 0.015" peak to peak displacement, 2.5g maximum acceleration |
| Operating Altitude [2] | Sea level – 10,000 feet |
| Non-Operating Altitude [2] | Sea level – 40,000 feet |

1  Shock and Vibration specifications are established using Solid State drives and non-rotating media.
2  Altitude Specification is established by using all internal component specifications.

**AGENCY CERTIFICATIONS AND APPROVALS**

| | |
|---|---|
| Front Panel NEMA Rating | NEMA 4/4X/12, IP66 |
| FCC | 47 CFR, Part 15, Class A |
| EU CE Marking Compliance | CE,  EN 55022, Class A, EN 61000-6-2, EN61000-3-3, EN 60950-1 |
| NA Safety Agency Approvals (panel mount versions only) | UL 508 Listed, ANSI/ISA 12.12.01 UL Listed*, cUL Listed CSA C22.2, #142, CSA C22.2, #213* |
| EU ATEX Zone 2/22 Approvals (optional configurations)*<br><br>Certificate Number: DEMKO 14 ATEX 1374X | EN 60079-0:2012+A11:2013, EN 60079-15:2010, EN 60079-11:2012, EN 60079-31:2009<br>- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -<br>II 3G Ex nA iC IIC T4 Gc IP66 III 3D Ex tc IIIC T66°C Dc IP66 0°C ≤ $T_{AMB}$ ≤ 55°C |
| Safety Agency Approvals (enclosed versions only)* | UL 508 Listed, cUL Listed CSA C22.2 #142 |

* See appropriate note below for the applicable unit or option being utilized.

## NOTES FOR CLASS I DIVISION 2 INSTALLATIONS:

**NOTE FOR CLASS I DIVISION 2 INSTALLATIONS (PANEL MOUNT VERSIONS):**

SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D, CLASS II DIVISION 2, GROUPS F AND G, CLASS III HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY

FOR USE ON A FLAT SURFACE OF A TYPE 1, 4, 4X, OR 12 ENCLOSURE WITH PROVISIONS FOR CLASS I DIVISION 2 WIRING METHODS

TEMPERATURE CODE: T5

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**NOTE FOR CLASS I DIVISION 2 INSTALLATIONS (RACK MOUNT VERSIONS):**

SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS, OR NONHAZARDOUS LOCATIONS ONLY

FOR RACK MOUNT INSTALLATION ON A TYPE 1 ENCLOSURE WITH PROVISIONS FOR CLASS I DIVISION 2 WIRING METHODS

TEMPERATURE CODE: T5

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**ADDITIONAL NOTES FOR CLASS I DIVISION 2 INSTALLATIONS:**

**WARNING – EXPLOSION HAZARD –** SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2

**WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOW TO BE FREE OF IGNITABLE CONCENTRATIONS.

**WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT THE USB PORTS UNLESS THE POWER HAS BEEN SWITCHED OFF AND THE AREA IS KNOWN TO BE NON-HAZARDOUS

**ATTENTION:** RISQUE D'EXPLOSION - NE PAS BRANCHER OU DÉBRANCHER LE PORTS USB  À MOINS QUE L'ALIMENTATION À ÉTÉ COUPÉE OU SI LA ZONE N'EST PAS HAZARDEUSE.

**ADVERTENCIA:** PELIGRO DE EXPLOSIÓN - NO CONECTE O DESCONECTE LOS PUERTOS USB A MENOS QUE LA COMPUTADORA SE ENCUENTRE APAGADA O EL ÁREA SE CONSIDERE NO PELIGROSA.

**WARNUNG:** EXPLOSIONSGEFAHR - USB PORTS NUR ANSCHLIEßEN ODER TRENNEN, WENN KEINE SPANNUNG ANLIEGT ODER DER BEREICH NICHT EXPLOSIONGEGEFÄHRDET IST.

## NOTES FOR ATEX ZONE 2/22 INSTALLATIONS:

**NOTE FOR ATEX ZONE 2/22 INSTALLATIONS (PANEL MOUNT VERSIONS):**

UNIT IS TO BE INSTALLED IN AN ATEX CERTIFIED IP54 (OR BETTER) ENCLOSURE.

THE EQUIPMENT SHALL ONLY BE INSTALLED WITHIN AN ENCLOSURE WHICH PROVIDES AN INTERNAL ENVIRONMENT RATED POLLUTION DEGREE 2, AS DEFINED IN IEC 60664-1.

PROVISIONS SHALL BE MADE TO PREVENT THE RATED VOLTAGE FROM BEING EXCEEDED BY TRANSIENT DISTURBANCES OF MORE THAN 140%.

**WARNING FOR ATEX ZONE 2/22 INSTALLATIONS (PANEL MOUNT VERSIONS):**

UNIT IS NOT INTENDED TO BE USED IN AREAS THAT CAN RESULT IN SEVERE IMPACT TO THE WINDOW, DAMAGE TO THE SCREEN CAN RESULT

**ADDITIONAL NOTES FOR ATEX ZONE 2/22 INSTALLATIONS**

> **WARNING – EXPLOSION HAZARD –** SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY ATEX ZONE 2/22 INSTALLATIONS

> **WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOW TO BE FREE OF IGNITABLE CONCENTRATIONS.

> **WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT THE USB PORTS UNLESS THE POWER HAS BEEN SWITCHED OFF AND THE AREA IS KNOWN TO BE NON-HAZARDOUS
>
> **ATTENTION:** RISQUE D'EXPLOSION - NE PAS BRANCHER OU DÉBRANCHER LE PORTS USB  À MOINS QUE L'ALIMENTATION À ÉTÉ COUPÉE OU SI LA ZONE N'EST PAS HAZARDEUSE.
>
> **ADVERTENCIA:** PELIGRO DE EXPLOSIÓN - NO CONECTE O DESCONECTE LOS PUERTOS USB A MENOS QUE LA COMPUTADORA SE ENCUENTRE APAGADA O EL ÁREA SE CONSIDERE NO PELIGROSA.
>
> **WARNUNG:** EXPLOSIONSGEFAHR - USB PORTS NUR ANSCHLIEßEN ODER TRENNEN, WENN KEINE SPANNUNG ANLIEGT ODER DER BEREICH NICHT EXPLOSIONGEGEFÄHRDET IST.

## NOTE FOR ENCLOSED UNIT INSTALLATIONS:

> **NOTE: (ENCLOSED VERSIONS**):
>
> A LISTED VESA STYLE MOUNT SUITABLE WITH A MINIMUM LOAD RATING OF 35 POUNDS SHALL BE USED IN THE END INSTALLATION
>
> FOR USE IN NONHAZARDOUS LOCATIONS ONLY
>
> TYPE 1 ENCLOSURE

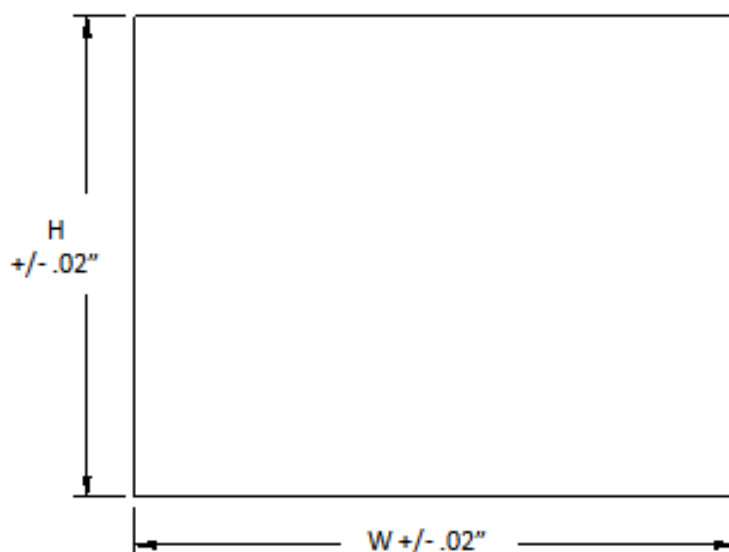## Chapter 2 - Installation of Computer

### Panel Mount M-Series Unit installation

The panel mount versions of the M-Series are intended to be mounted in and used where NEMA 1, NEMA 4/4x and NEMA 12 type enclosures are employed. Enclosures made of heavier gauge metal work better because they won't deform or bend as easily when the monitor's sealing gasket is compressed. The monitor meets NEMA 4/12 sealing specifications when properly installed in an approved NEMA enclosure constructed from 14-gauge or heavier steel.   The computer uses "U"-shaped clips and a special gasket to achieve the proper seal.
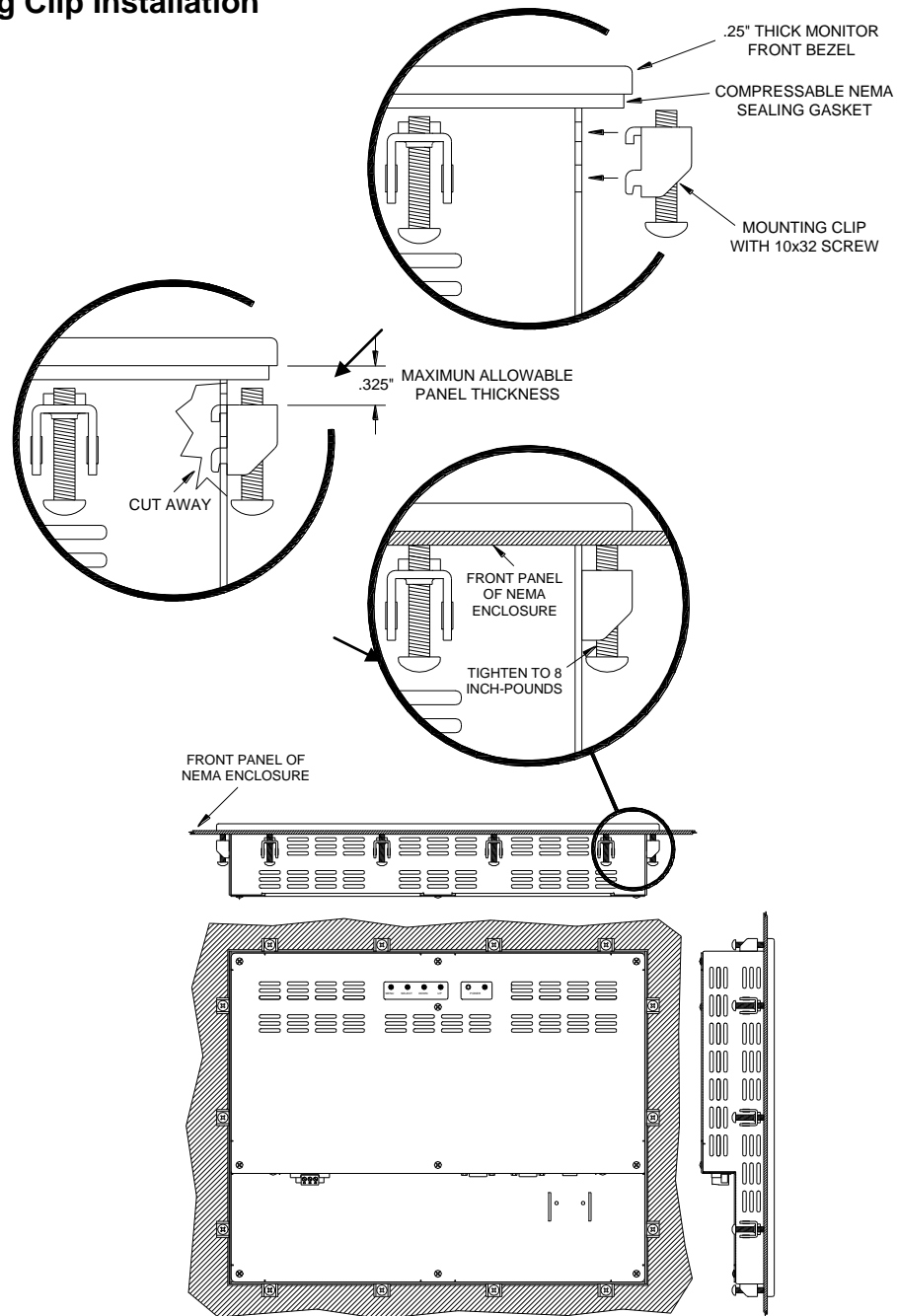
When selecting an enclosure remember to allow adequate space around the rear of the computer for good air flow. Do not block air flow from below or above the monitor. If possible mount the computer in a vertical orientation. The unit is designed to work in environments up to 50 degrees Centigrade ambient temperature inside the enclosure. Remember to account for heat dissipated from other equipment that may be installed inside the same enclosure.

To install the computer, make a cutout according to the diagrams below in one of the walls of your NEMA enclosure.  Next hold the unit in place while you install the mounting clips.   Tighten the clips to the point where the back of the unit's front bezel just begins to contact the front of the NEMA enclosure. The use of an adjustable torque driver is recommended. The screws should be tightened to 8 inch-pounds. Tighten the clips in a cross pattern. This will help to develop an even pressure on the sealing gasket. **DO NOT OVER TIGHTEN AS DAMAGE CAN RESULT IN THE COMPUTER CAUSING LOSS OF SEALING INTEGRITY.**

| | M1200 | M1500 & M1500SR | M1700 | M1900 | M2200WT |
|---|---|---|---|---|---|
| Cutout Dimensions (H x W) | 9.68" x 12.10" (245.9mm x 307.3mm) | 12.00" x 15.00" (305mm x 381mm) | 13.70" x 16.35" (348mm x 415.3mm) | 14.90" x 17.75" (378.5mm x 450.9mm) | 14.20" x 21.2" (473.8mm x 296.1mm) |

## Mounting Clip Installation

.25" THICK MONITOR FRONT BEZEL

COMPRESSABLE NEMA SEALING GASKET

MOUNTING CLIP WITH 10x32 SCREW

.325" MAXIMUN ALLOWABLE PANEL THICKNESS

CUT AWAY

FRONT PANEL OF NEMA ENCLOSURE

TIGHTEN TO 8 INCH-POUNDS

FRONT PANEL OF NEMA ENCLOSURE

**REAR VIEW OF PANEL
MOUNTED M-SERIES MONITOR**

**NOTE:** WHEN INSTALLING THE MOUNTING CLIPS TIGHTEN THE SCREWS TO **8-10 INCH-POUNDS MAXIMUM**. OVERTIGHTENING THE SCREWS WILL RESULT IN A COMPRIMISED NEMA SEAL AND MAY CAUSE TOUCH SCREEN BREAKAGE.

## Rack Mount Unit Installation

The M1900 with a rack mount front panel is intended to be mounted to a 19.0" wide rack in a NEMA Type 1 or better enclosure. The unit can be mounted using standard rack mount hardware (not supplied) via the eight (4 each side) counter-bored holes in the front of the panel. The front panel is intended to be mounted in a vertical height of 9 U (16.0") on the rack. This unit is not NEMA sealed when mounted like the panel mount versions.

When selecting an enclosure remember to allow adequate space around the rear side of the computer for good air flow. The unit is designed to work in environments up to 50 degrees Centigrade ambient temperature inside the enclosure. Remember to account for heat dissipated from other equipment that may be installed inside the same enclosure.

## Enclosed Unit Installation

The enclosed M-Series products are intended to be stand-alone NEMA Type 1 units. These are required to be mounted to a VESA style mount with a minimum load rating of 35 pounds. A desktop stand, wall mount, or articulating arms are examples of VESA style mounts that can be utilized. These units are vented for air flow and are not dust or water proof. Care should be taken to not utilize these units in areas where high concentration of particulate matter or moisture are present. If these conditions do exist then the use of the panel mount versions in an appropriate NEMA 4, 4x, or 12 enclosure should be considered. The warranty may be voided if high levels of moisture or particulate matter are determined to be the cause of a failure.

These units are designed to work in environments up to 50 degrees Centigrade ambient temperature around the enclosure. Impeding the airflow around this unit or clogged filters will severely affect the reliability of the unit by raising the internal temperature. Assure that there is adequate airflow around the unit.

NEMA Type 1 is not sealed against water and/or dust; it is simply provides protection from operators shocking themselves. It also offers a certain amount of fire containment it the event of a catastrophic failure inside the unit. As stated previously NEMA 1 is not waterproof or dust proof and is not intended to be utilized in environments exhibiting high levels of these conditions.



Example of an Enclosed Unit Mounted
To an Articulating Arm

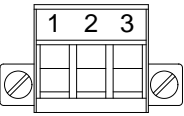## Connecting Power to the M-Series

### Connecting power to the Panel Mount and Rack Mount M-Series units:

The M-Series units are powered from 100-240 VAC, 50/60 Hz or optionally from 24 VDC. ***Damage will occur if 100-240 VAC power is connected to an M-Series unit equipped with the 24 VDC input power option.*** ePC-Series equipped units with the 24 VDC option will have a "-24" suffix in their model number such as M1500-24 or M1900T-24.

Because the M-Series units (not –EN option) are UL 1604 listed for Hazardous Location use, (Class I Division2, Groups A, B, C, D; Class II Division 2 Groups F and G, Class III), the units do not have a power switch for switching off supplied power. Consideration should be give to the installation of an appropriately rated external power switch if the application requires powering off the M-Series unit.

Power is connected to the units through a removable Phoenix Contact plug (Phoenix Contact P.N. 1777992) that allows for screw termination of field wiring. This plug is included with each unit and is keyed to prevent installation in a unit with the wrong input voltage rating. **When Field Wiring to these terminals the use of 18 AWG or greater (12 AWG maximum) copper wire with 60⁰C or 60/75⁰C wire insulation and the terminal tightening torque of 7.0 lb/in. (0.79 Nm) is required.** The terminal screws are shown in "Top View" below. Connect the field wiring according to the appropriate voltage in the table below. Strip the wire insulation back on each conductor **6.5 mm (0.26 in)** and assure that the remaining wire is twisted together, not frayed, and clean. If an outer jacket over each conductor is utilized then strip the outer jacket back an additional **19.0 mm (0.75 in)** as shown in figure below. When installing the conductors take care that there are not any stray strands of wire that can contact an adjoining connection. Tinning of each lead can be utilized to prevent frays if desired. Optionally the included protective cover can be utilized to prevent electrical shocks when handling the power connector and provide strain relief for each conductor connection (see the following section for installation instructions). After the connections are made, make sure the plug retention screws (the two screws shown in the "Front View" below) are securely tightened. This will prevent the plug from pulling out. The use of these screws is mandatory when the unit is utilized in applications requiring hazardous locations approvals.
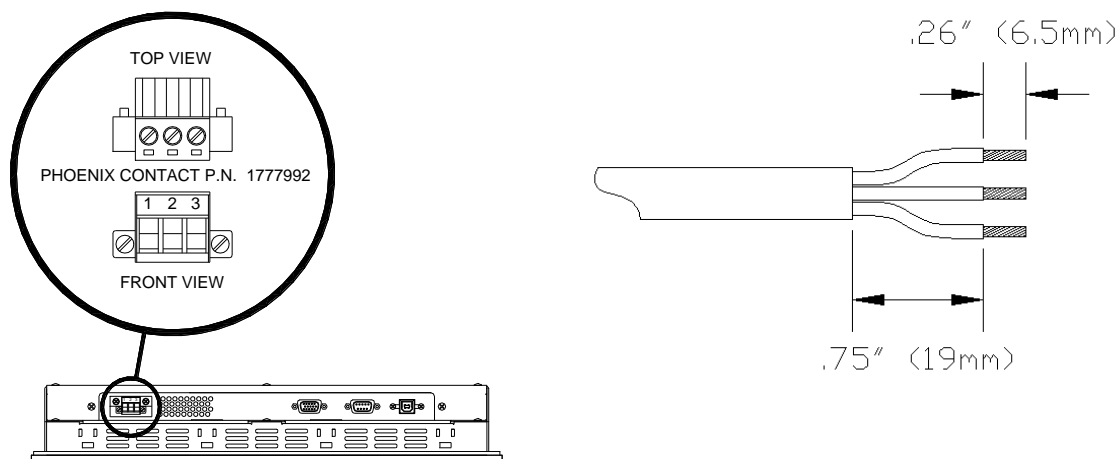


| | PIN NUMBER | 100 VAC – 240 VAC INPUT | 18 VDC – 36 VDC INPUT |
|---|---|---|---|
| | 1 | AC Line Input | + DC Input |
| | 2 | AC Neutral Return | - DC Return |
| FRONT VIEW | 3 | Protective Earth Ground | Protective Earth Ground |

**NOTE:** WHEN USING USB CONNECTION FOR THE TOUCHSCREEN THE USE OF THE USB RETENTION BRACKET IS REQUIRED FOR HAZARDOUS LOCATIONS AND HIGHLY RECOMMENDED FOR NONHARDAOUS

**NOTE:** TO PREVENT INADVERTENT DISCONNECTION OF VIDEO AND/OR SERIAL TOUCHSCREEN CABLES ASSURE THAT THE THUBSCREWS ARE SUFFICIENTLY TIGHTENED.

**WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOW TO BE FREE OF IGNITABLE CONCENTRATIONS.

**WARNING – EXPLOSION HAZARD –** DO NOT DISCONNECT THE USB PORTS UNLESS THE POWER HAS BEEN SWITCHED OFF AND THE AREA IS KNOWN TO BE NON-HAZARDOUS

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**Protective Cover Installation**
(Optional if desired)

**Step 1:** Gather the parts of the protective cover; top shell, bottom shell, label insert, and wire tie. The picture shows wire tie (top), label insert (right), bottom shell (left), and top shell (lower right).
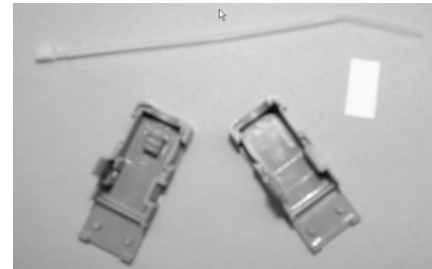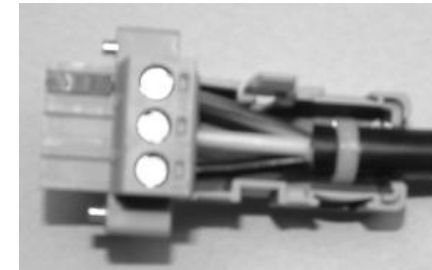
**Step 2:** Insert your pre-wired connector (with the screws facing up) into the bottom shell. (See manual for cable wiring instructions).
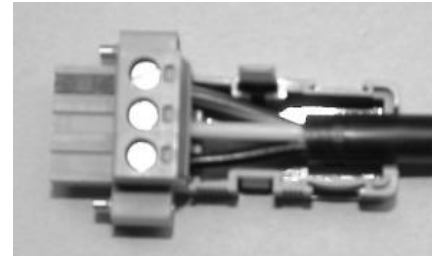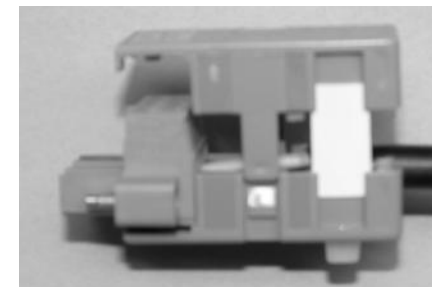
**Step 3:** Insert the wire tie from the bottom shell, loop around the cable and come back out of the opposite hole in the bottom shell.
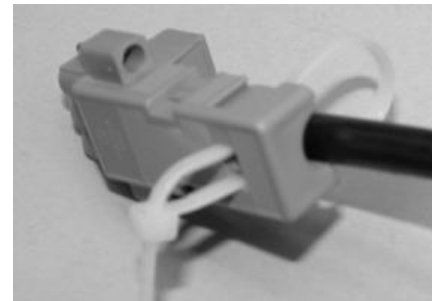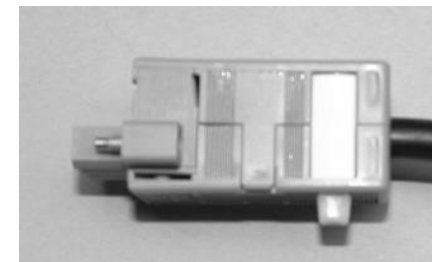
**Step 4:** Tighten the wire tie around the cable and the bottom shell.

**Step 5:** Seat the top shell onto the bottom as shown. Insert label strip (if desired) in slot on top shell and bottom shell.

**Step 6:** Snap the top and bottom shells together.

**Connecting Power to Enclosed (-EN) units:**

The enclosed M-Series units are powered from 100-240 VAC, 50/60 Hz only. Because these are stand alone Type 1 devices and do not require an additional NEMA type enclosure, a different type power connection is required. These units use a more standard IEC type power cord like found on most computers. There is a retention clip that can be utilized to help retain the cord from falling out. A US three prong cord is supplied. If another country connection method is required then an appropriate UL recognized power cord can be chosen locally (not supplied by Nematron). Optionally available is an IEC type connector that can be directly wired to for field wiring. This can be ordered separately from Nematron and is part number PWR-AC-EN



Enclosed M-Series IEC Power Cable                    Power Cable Retention Clip Installed

## Connection of VGA and Touch Screen Cables

Connect either a 15-pin VGA or DVI-D cable and either an RS-232 or USB cable if the monitor is equipped with a touch screen. All communication cables should include a chassis ground shield. Hazardous location, Division 2, requires that all cables have adequate strain relief. For this reason, tighten all connector thumb screws securely. If a USB cable is being used, install the provided USB retention bracket. Insert the USB connector through the square cutout in the base of the bracket and pull the cable and body of the connector back through the round hole in the bracket flange. Now insert the bracket into the two slots on the rear of the monitor and side it forward so the connector is fully inserted in the mating bulkhead connector. Install and tighten two 4-40 x .25" Philips screws.
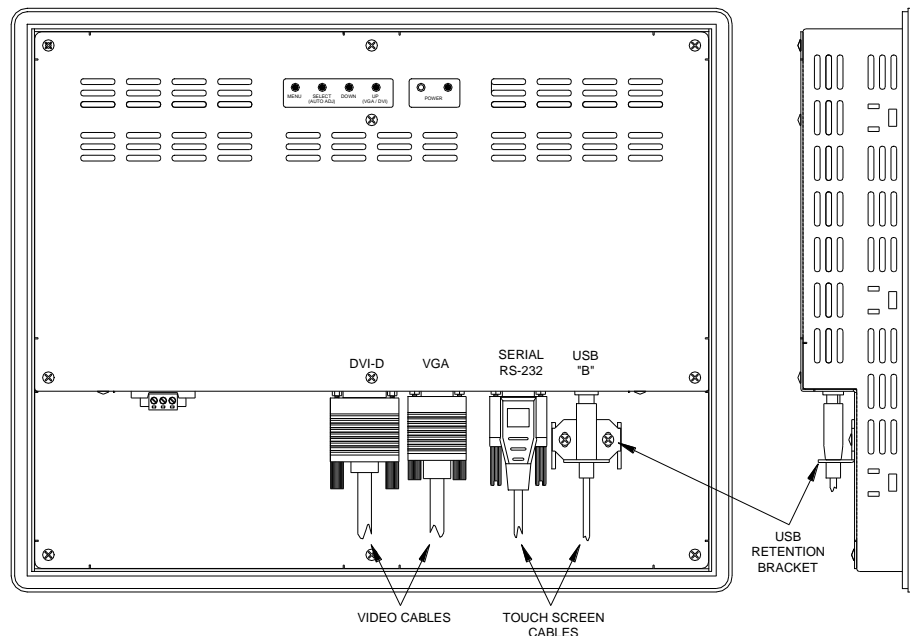
## Turning on the Computer and Monitor

With power applied to the monitor and all cables connected you may power up the computer and press the POWER button on the rear of the monitor. The POWER LED will switch from off to green. The monitor will perform an automatic self configuration and begin displaying an image. If no image appears, it may be because the monitor has the wrong video input selected. Press the UP button on the rear of the monitor to change between VGA and DVI-D inputs. If the computer is subsequently powered off, the monitor will remain on and display the NO SIGNAL error message indefinitely. The POWER LED remains green. The touch screen remains active during this time. When the computer is powered on again, the NO SIGNAL message disappears and normal image display resumes.

## Selection of PC Video Settings

Although the M-Series monitors can display several different video modes, the optimum display image performance occurs when the PC's video settings match the native resolution of monitor's LCD. For this reason it is recommended that you set the video mode optimal for the size M-Series unit that you have.  Refer to the table on Page 5 to determine the optimal resolution for your monitor.

This can be done using Window's control panel or by right clicking on the desktop and choosing "Properties". This will bring up the "Display Properties" menu. From this menu, select the "Setting" tab and choose the optimal Screen resolution. From the Settings menu, choose "Advanced" and then click on the "Monitor" tab to set the Screen refresh rate.

## Installing the Touch Screen Driver Software

Drivers for the following operating systems are located on the enclosed CD:

Windows 7 (32 & 64-bit)

Windows Vista**\***

Windows XP

Windows 2000**\*\***

Windows Me

Windows 98

Windows 95

Windows NT 4.0**\*\***

DOS and Windows 3.x**\*\*\***


***Notes***:  **\*** The driver for Windows Vista only supports USB touchscreen connections.  RS-232 Serial touchscreen and multiple monitor connections are not supported.

**\*\*** For Windows 2000 and NT 4.0 you must have administrator access rights to install the driver.

**\*\*\*** All of the drivers are self extracting and executing except for the DOS and Windows 3.x driver. This has an install.exe file that will need to be run.

# Chapter 3 - Monitor OSD and Settings

## On Screen Display (OSD) Controls

The OSD controls are used for making adjustments to the monitor's settings and are located on the back of the monitor. They consist of a single LED and five push buttons whose functions are described in the tables below.
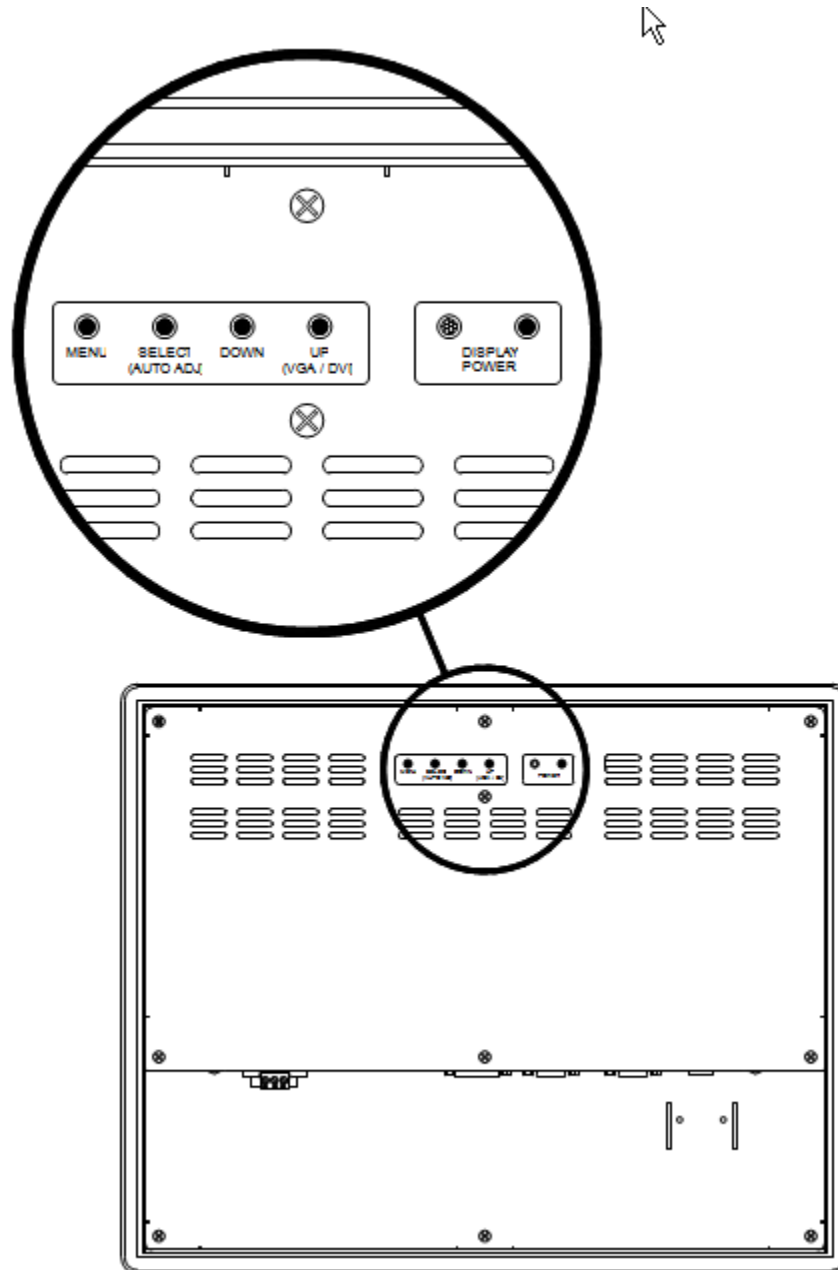
## Button and LED Functions

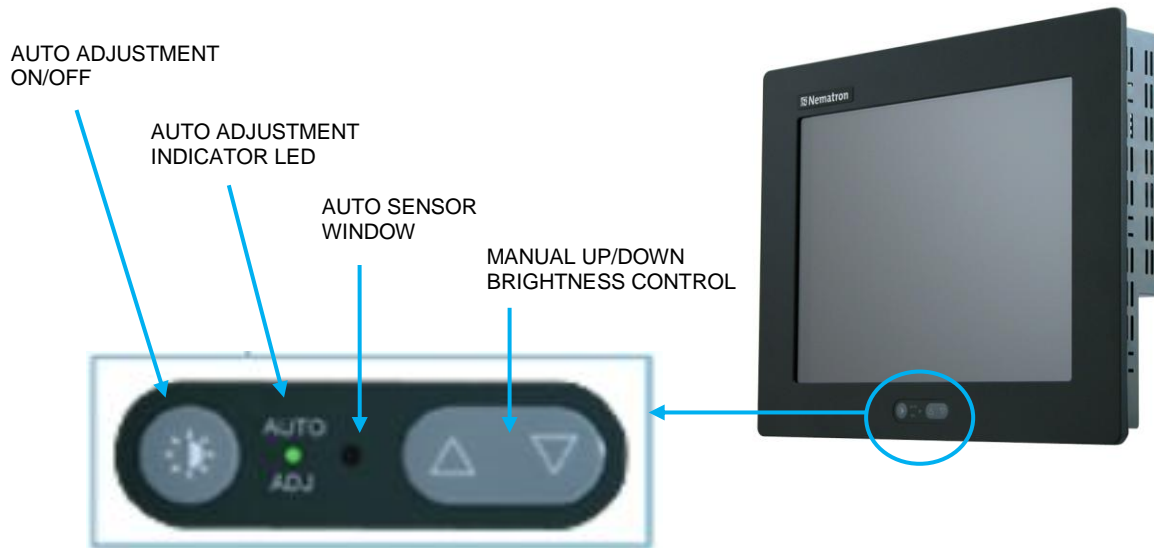| BUTTON | FUNCTION |
|---|---|
| DISPLAY POWER | Pressing this button once wakes the monitor up. Pressing the POWER button again turns off the back light inverter and puts the monitor in a reduced power state but the touch screen remains active. It is important to note that this switch does not disconnect power from the monitor. Power is always supplied to the internal AC/DC power supply (or the optional 24V DC to DC converter) which in turn, continually supplies power to the internal monitor electronics and the optional touch screen controller. |
| MENU | Pressing this button causes the main OSD menu to be displayed. Pressing it again will cause the Main OSD menu to disappear. If the button is not pressed a second time, the main OSD menu will disappear after the set timeout period. |
| SELECT (AUTO ADJ) | When the OSD main menu is displayed, pressing this button selects one of five sub-menus. Within a sub-menu, this button selects and deselects menu choices. |
| | **HOT KEY:** When the OSD is not displayed, pressing this button will initiate an automatic configuration and cause the "Processing Auto Configuration" message to be displayed. |
| DOWN | Within the main OSD menu and sub-menus, this button acts as an down cursor key, moving the highlighted item for selection to move downward to the next highlighted item for selection. |
| | When an item has been selected from a sub-menu, pressing this key decreases its value. |
| UP (VGA / DVI) | Within the main OSD menu and sub-menus, this button acts as an up cursor key, moving the highlighted item for selection to move upward to the next highlighted item for selection. |
| | When an item has been selected from a sub-menu, pressing this key increases its value. |
| | **HOT KEY:** When the OSD main menu is not displayed, pressing this button causes the monitor to switch between VGA (PC) and DVI (Digital) video inputs. |

| LED | FUNCTION |
|---|---|
| Not Lit | Power off mode. |
| Green | Monitor is on and receiving a normal video signal. |
| Amber | Monitor is on but in DPMS (Display Power Management Signaling) mode because it is not receiving a normal incoming video signal. |

> **WARNING -** PRESSING THE DISPLAY POWER ONLY REMOVES POWER TO THE BACKLIGHT INVERTER. THE TOUCHSCREEN IS STILL ACTIVE WHEN DISPLAY POWER IS OFF.

## M1500SR Front Accessible Brightness Controls

On the M1500SR there is a front accessible brightness control keypad.  It is located on the bottom center of the front panel.  It consists of 3 functional buttons, an indicator LED, and a sensor window as shown below.
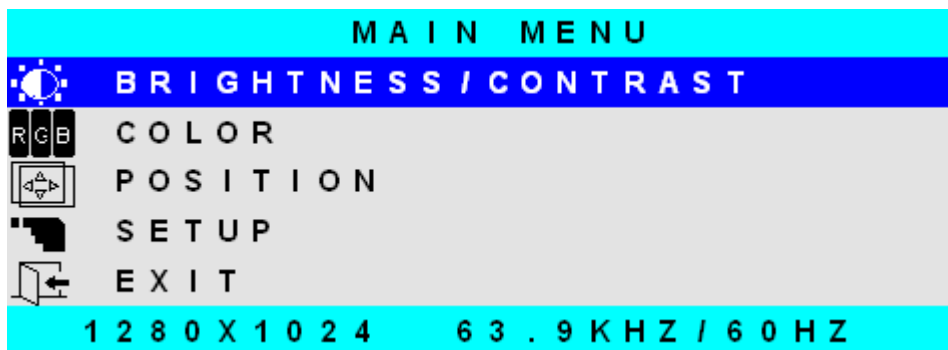
AUTO ADJUSTMENT
ON/OFF

AUTO ADJUSTMENT
INDICATOR LED

AUTO SENSOR
WINDOW

MANUAL UP/DOWN
BRIGHTNESS CONTROL

Front Panel Display Controls
- Brightness / Auto Adjust Sensor

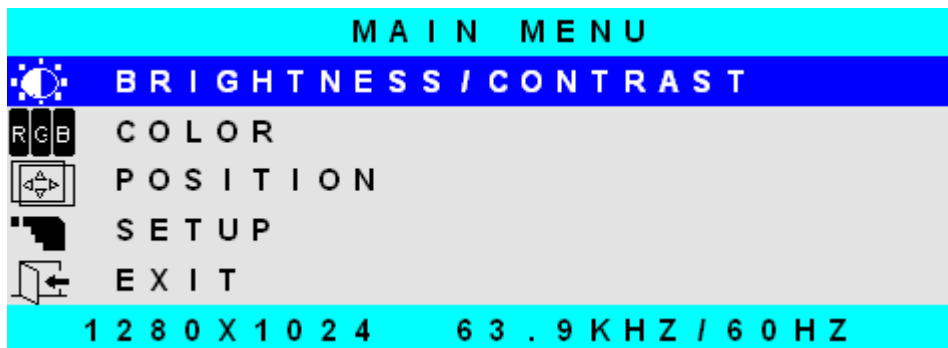| BUTTON | FUNCTION |
|---|---|
| AUTO ADJUSTMENT ON/OFF | Pressing this button once will turn the Auto Adjustment Function (indicated by AUTO ADJ LED turning on).  Pressing again turns the Auto Adjustment Function off (indicated by LED on AUTO ADJ LED turning off) |
| AUTO ADJ INDICATOR LED | Indicates whether Auto Adjustment function is on or off.  When lit the AUTO ADJ function is active.  When not lit the AUTO ADJ function is off and brightness is in manual mode (adjusted only by the Manual UP/DOWN buttons). |
| AUTO ADJ SENSOR | Senses ambient lighting to allow AUTO ADJ function to adjust the brightness up or down.  NOTE: Blocking or covering this small circular window will cause the AUTO ADJ function (when on) to adjust to full brightness by blocking ambient light. |
| MANUAL UP/DOWN BRIGHTNESS CONTROL | Pressing the UP (▲) arrow will automatically turn off the AUTO ADJ function and will allow you to adjust the brightness higher, up to maximum brightness. Pressing the DOWN (▼) arrow will automatically turn off the AUTO ADJ function and will allow you to adjust the brightness lower, down to all backlights off.  NOTE: Once one of these buttons is pressed the AUTO ADJ function is turned off and will not turn back on until the Auto Adjustment Button is turned on. |

## OSD Menus and Settings

**MAIN MENU**

The following section describes the monitor's OSD menus and settings. With the monitor powered up and receiving a normal video signal, pressing the MENU button once will cause the following screen to appear:

```
            M A I N   M E N U
 ☼   B R I G H T N E S S / C O N T R A S T
RGB  C O L O R
     P O S I T I O N
     S E T U P
     E X I T
     1 2 8 0 X 1 0 2 4     6 3 . 9 K H Z / 6 0 H Z
```

Pressing MENU again will turn this screen off. Alternatively it will turn off after a time out period that is set in the SET UP sub-menu. Finally it can be turned off by pressing the DOWN button to move the blue highlighted band down to the EXIT sub-menu and pressing the SELECT button.

The bottom line on this screen displays the incoming video horizontal and vertical resolution and refresh rates.

**BRIGHTNESS/CONTRAST**

```
            M A I N   M E N U
 ☼   B R I G H T N E S S / C O N T R A S T
RGB  C O L O R
     P O S I T I O N
     S E T U P
     E X I T
     1 2 8 0 X 1 0 2 4     6 3 . 9 K H Z / 6 0 H Z
```

**BRIGHTNESS**

With BRIGHTNESS/CONTRAST highlighted on the MAIN MENU pressing SELECT will cause the following screen to be displayed:

```
 B R I G H T N E S S ◄ ||||||||||||||||||||·········· ►
 C O N T R A S T     ◄ ||||||||||||||||||||·········· ►
 E X I T
```
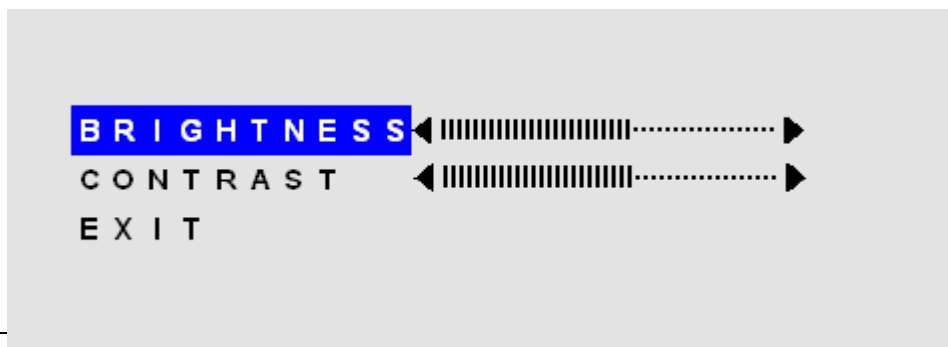
Pressing the SELECT button will cause the following screen to be displayed:

```
B R I G H T N E S S  ◀||||||||||||||||||||||·············· ·▶    5 0
C O N T R A S T       ◀|||||||||||||||||||··············· ▶
E X I T
```

Pressing the UP and DOWN buttons will adjust the brightness accordingly. Pressing the SELECT button again will deselect this function causing the following screen to appear:
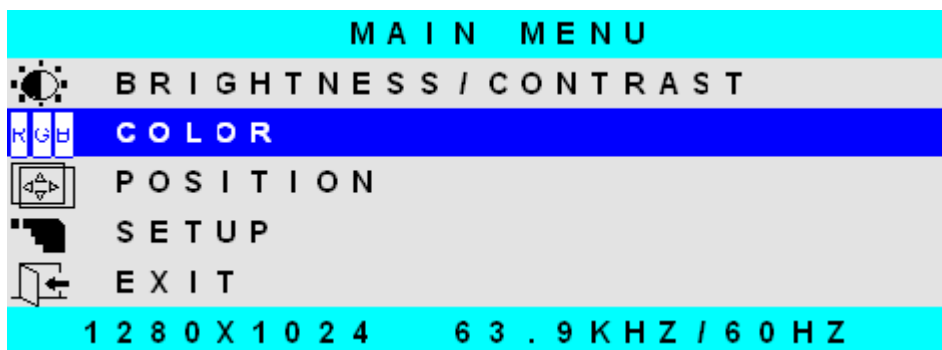
```
B R I G H T N E S S ◀|||||||||||||||||||||||·············· ▶
C O N T R A S T     ◀|||||||||||||||||||||·············· ▶
E X I T
```

**CONTRAST**

Pressing the DOWN button once and the SELECT button once will cause the following screen to appear:

```
B R I G H T N E S S ◀||||||||||||||||||||||||·············· ▶
C O N T R A S T        ◀|||||||||||||||||||||||·············· ·▶    5 0
E X I T
```
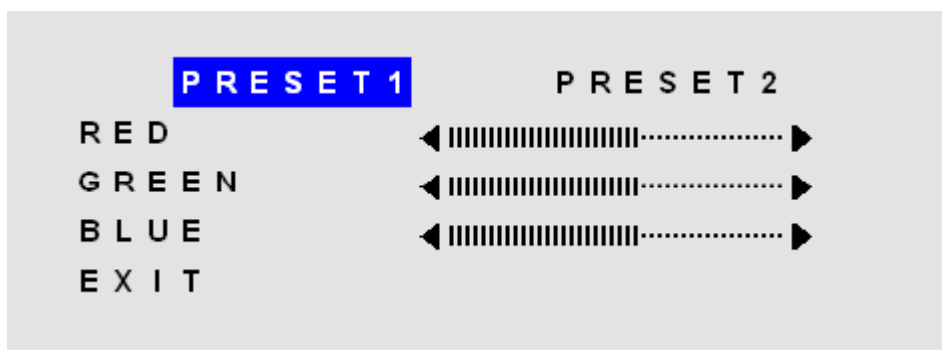
Pressing the UP and DOWN buttons will adjust the contrast accordingly. Pressing the SELECT button again will deselect this function. Press the DOWN button to highlight EXIT and then pressing SELECT will return to the MIN MENU.
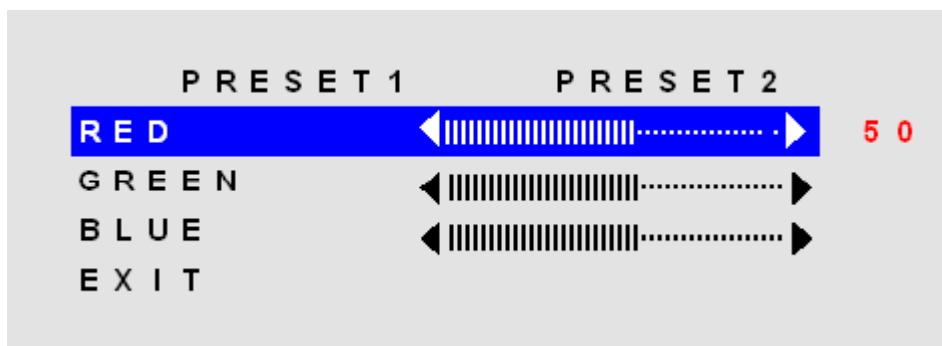
**COLOR**

```
        M A I N   M E N U
 ☼  B R I G H T N E S S / C O N T R A S T
RGB  C O L O R
 ⬙  P O S I T I O N
 ⬐  S E T U P
 ⬀  E X I T
     1 2 8 0 X 1 0 2 4     6 3 . 9 K H Z / 6 0 H Z
```

With COLOR highlighted on the MAIN MENU pressing SELECT will cause the following screen to be displayed:

```
        P R E S E T 1          P R E S E T 2
  R E D          ◀||||||||||||||||||||···········▶
  G R E E N      ◀||||||||||||||||||||···········▶
  B L U E        ◀||||||||||||||||||||···········▶
  E X I T
```
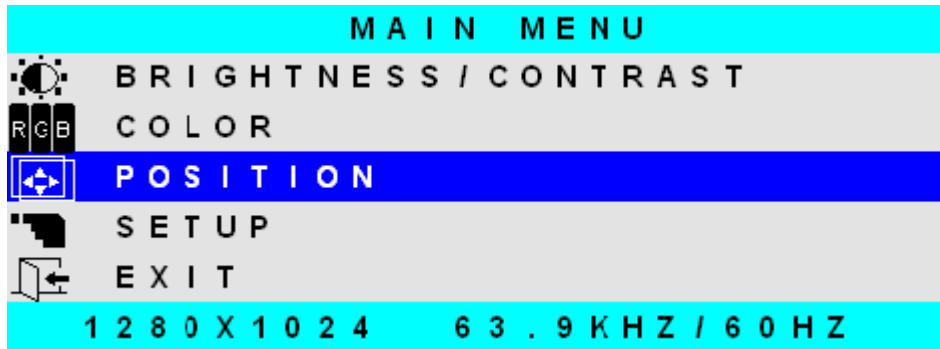
PRESET1 and PRESET2 are preset color balances. PRESET1 is produces a bluer screen while PRESET2 produces a more aqua screen. Use the UP and Down buttons to highlight PRESET1 or PRESET2 and press SELECT to make your selection and return to the MAIN MENU. If you highlight RED GREEN or BLU and press select, the following screen appears:

```
        P R E S E T 1          P R E S E T 2
  R E D          ◀||||||||||||||||||||·········· ·▶   5 0
  G R E E N      ◀||||||||||||||||||||···········▶
  B L U E        ◀||||||||||||||||||||···········▶
  E X I T
```
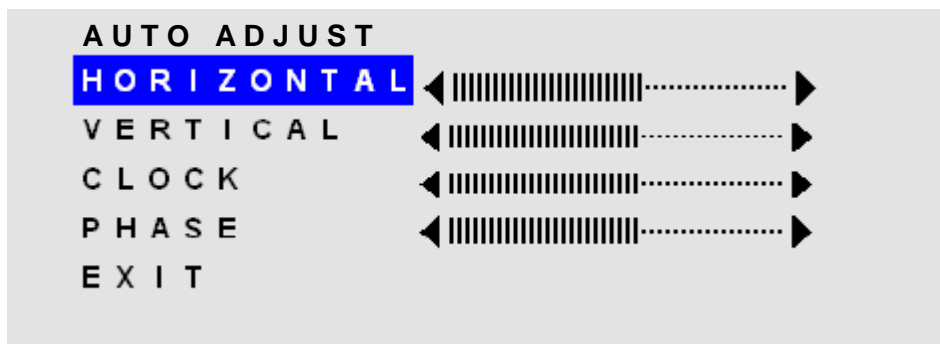
Pressing the UP and DOWN buttons causes the setting to change from the default of 50 to a value between 0 and 100. Pressing SELECT again saves the setting and deselects the menu item. Highlighting EXIT and pressing SELECT will return to the MAIN MENU.

---

**POSITION**

```
           M A I N   M E N U
      B R I G H T N E S S / C O N T R A S T
RGB   C O L O R
      P O S I T I O N
      S E T U P
      E X I T
      1 2 8 0 X 1 0 2 4      6 3 . 9 K H Z / 6 0 H Z
```

      With POSITION highlighted on the MAIN MENU, pressing SELECT will cause the following screen to be displayed:

```
A U T O   A D J U S T
H O R I Z O N T A L   ◄ |||||||||||||||||||||···········► 
V E R T I C A L       ◄ ||||||||||||||||||||···········► 
C L O C K            ◄ ||||||||||||||||||||···········► 
P H A S E            ◄ ||||||||||||||||||||···········► 
E X I T
```

**AUTO ADJUST**

      Highlighting AUTO ADJUST and pressing SELECT will initiate an automatic configuration and cause the "Processing Auto Configuration" message to be displayed.

```
          P R O C E S S I N G

   A U T O   C O N F I G U R A T I O N
```
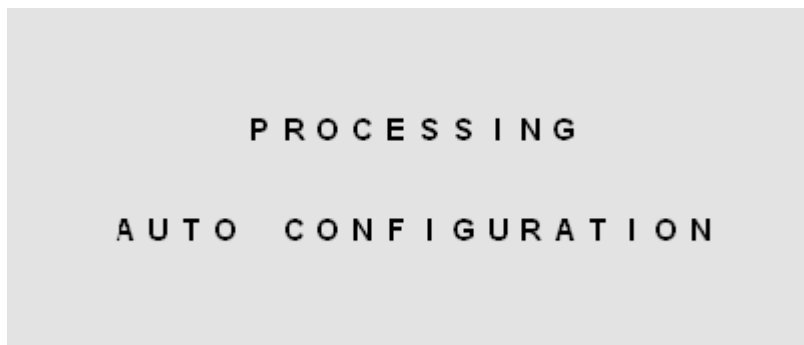
      During the auto configuration process, the monitor automatically centers the screen horizontally and vertically, sets the clock and optimizes the phase. After the process is complete, the screen is cleared of the OSD menu.

**HORIZONTAL**

With HORIZONTAL highlighted on the POSITION menu, pressing SELECT will cause the following screen to be displayed:
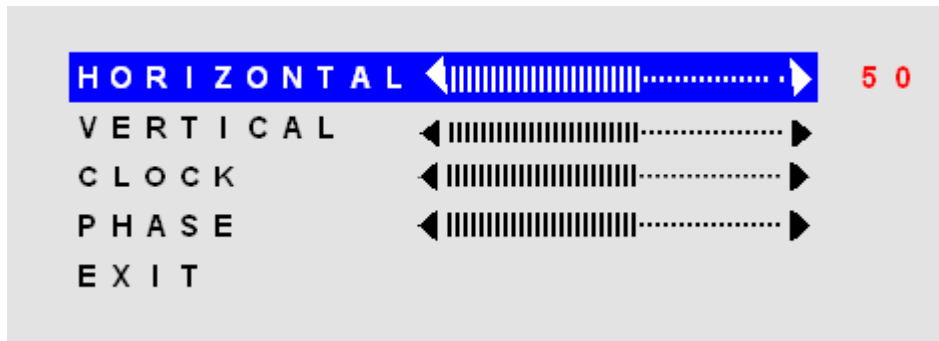


Pressing the UP button causes the screen to move to the right while pressing the DOWN button causes the screen to move to the left.  A setting number in the range of 0 to 100 is displayed. Pressing SELECT again will deselect the HORIZONTAL menu option and the setting will be saved.

**VERTICAL**

With VERTICAL highlighted on the POSITION menu, pressing SELECT will display the VERTICAL adjustment menu. Pressing UP will cause the screen to move upward and pressing DOWN will cause the screen to move downward. A setting number in the range of 0 to 100 is displayed. Pressing SELECT again will deselect the VERTICAL adjustment menu and the setting will be saved.

**CLOCK**

With CLOCK highlighted on the POSITION menu, pressing SELECT will display the CLOCK adjustment menu. Pressing UP increases the CLOCK and causes the screen to increase in width. Pressing the DOWN button causes the CLOCK to decrease and the screen to reduce in width. A setting number in the range of 0 to 100 is displayed. Pressing SELECT again will deselect the CLOCK adjustment menu and the setting will be saved. Adjustment of this setting is normally not needed as it is automatically set to its optimum setting each time the monitor is turned on or when AUTO ADJUSTMENT is selected.
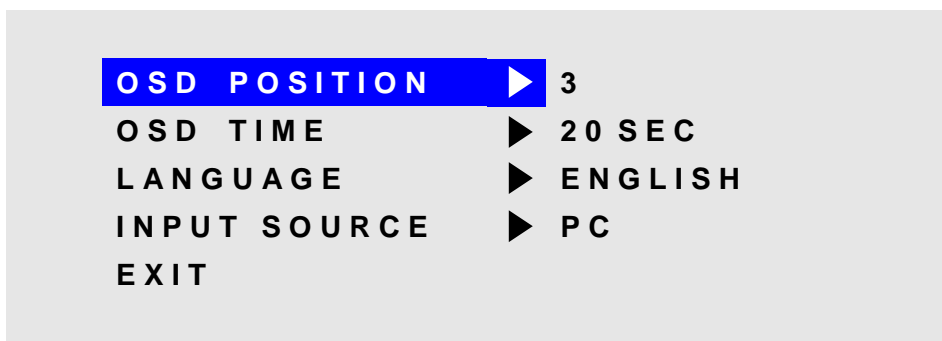
**PHASE**

With PHASE highlighted on the POSITION menu, pressing SELECT will display the PHASE adjustment menu. Pressing UP increases the PHASE. Pressing the DOWN button causes the PHASE to decrease. A setting number in the range of 0 to 100 is displayed. Pressing SELECT again will deselect the PHASE adjustment menu and the setting will be saved. Adjustment of this setting is normally not needed as it is automatically set to its optimum setting each time the monitor is turned on or when AUTO ADJUSTMENT is selected.
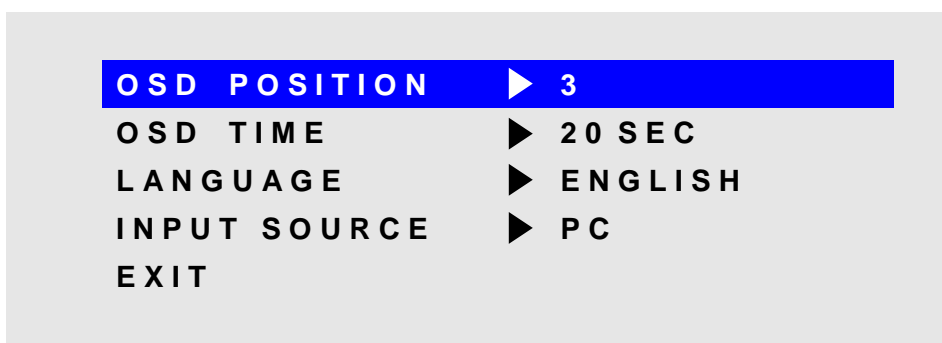
**SETUP**

```
         M A I N   M E N U
 ☼  B R I G H T N E S S / C O N T R A S T
RGB  C O L O R
 ⊕  P O S I T I O N
 ≡  S E T U P
 ⤶  E X I T
     1 2 8 0 X 1 0 2 4     6 3 . 9 K H Z / 6 0 H Z
```
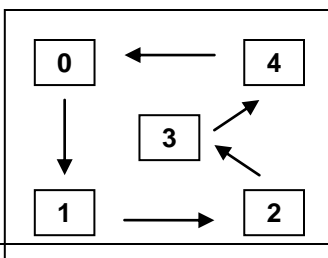
**OSD POSITION**

With SETUP highlighted on the MAIN MENU pressing SELECT will cause the following screen to be displayed:

```
 O S D   P O S I T I O N    ▶  3
 O S D   T I M E            ▶  2 0 S E C
 L A N G U A G E            ▶  E N G L I S H
 I N P U T   S O U R C E    ▶  P C
 E X I T
```

With the OSD POSITION highlighted on the SETUP menu, pressing SELECT will cause the following screen to be displayed:

```
 O S D   P O S I T I O N    ▶  3
 O S D   T I M E            ▶  2 0 S E C
 L A N G U A G E            ▶  E N G L I S H
 I N P U T   S O U R C E    ▶  P C
 E X I T
```

The default position of the OSD menu is 3 which is in the center of the screen. Pressing the UP or DOWN buttons will cause the OSD to move in the pattern below:

Pressing SELECT again will deselect the OSD POSITION adjustment menu and the setting will be saved.
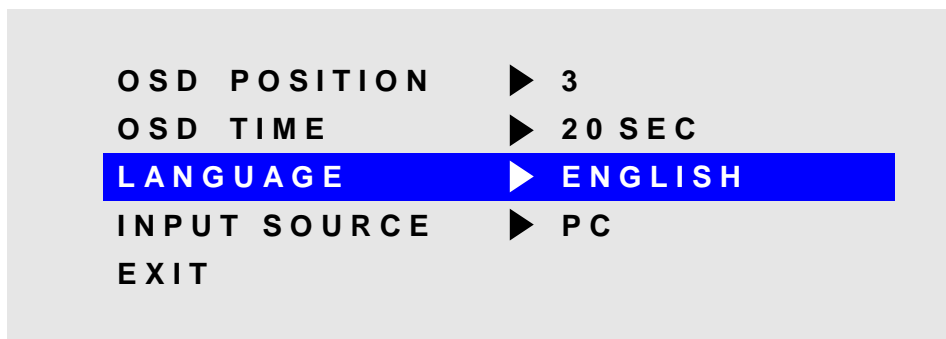
**OSD TIME**

With OSD TIME highlighted on the SETUP menu, pressing SELECT will cause the following screen to be displayed:

```
OSD  POSITION    ▶  3
OSD  TIME        ▶  20SEC
LANGUAGE         ▶  ENGLISH
INPUT  SOURCE    ▶  PC
EXIT
```
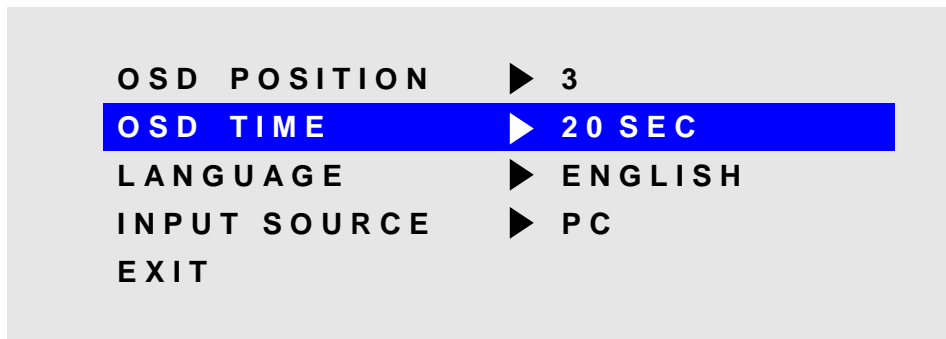
Pressing the UP and DOWN buttons will the allow adjustment of the OSD time out setting in the range from 5 to 60 seconds. Pressing SELECT again will deselect the OSD TIME menu and save the current setting.

**LANGUAGE**

With LANGUAGE highlighted on the SETUP menu, pressing SELECT will cause the following screen to be displayed:

```
OSD  POSITION    ▶  3
OSD  TIME        ▶  20SEC
LANGUAGE         ▶  ENGLISH
INPUT  SOURCE    ▶  PC
EXIT
```
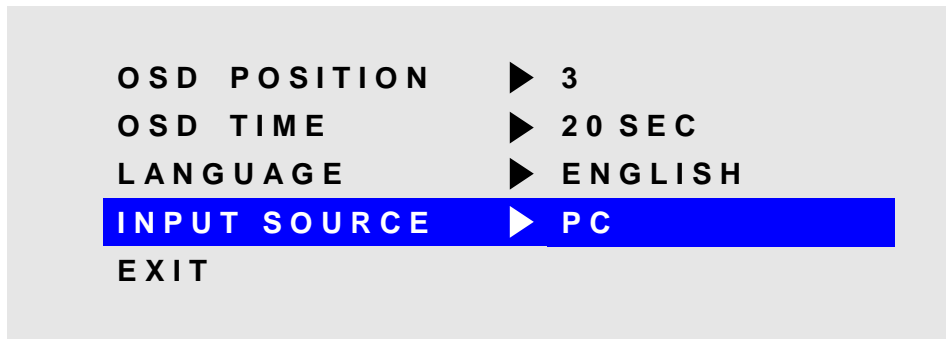
Pressing the UP and DOWN buttons allows the following LANGUAGE choices:

ENGLISH

FRANCAIS

DEUTSCHE

ITALIANO

ESPANOL

Pressing SELECT will deselect the LANGUAGE option menu and save the current selection.

**INPUT SOURCE**

With INPUT POSITION highlighted on the SETUP menu, pressing SELECT will cause the following screen to be displayed:

```
OSD  POSITION    ▶  3
OSD  TIME        ▶  20 SEC
LANGUAGE         ▶  ENGLISH
INPUT  SOURCE    ▶  PC
EXIT
```

Pressing the UP and DOWN buttons switches between PC (the 15-pin analog VGA input connector) and DIGITAL (the DVI-D input connector) Pressing SELECT will deselect the INPUT SOURCE option menu and save the current selection.

## OSD Message Displays

### OUT OF FREQUENCY

The following OSD message will appear if the horizontal or vertical refresh rate of the incoming video signal is outside the range of the monitor.

```
OUT  OF  FREQUENCY

9 6 . 4 k H z /   9 0 . 0 H Z
POWER  MANAGEMENT  2 0 S E C
```
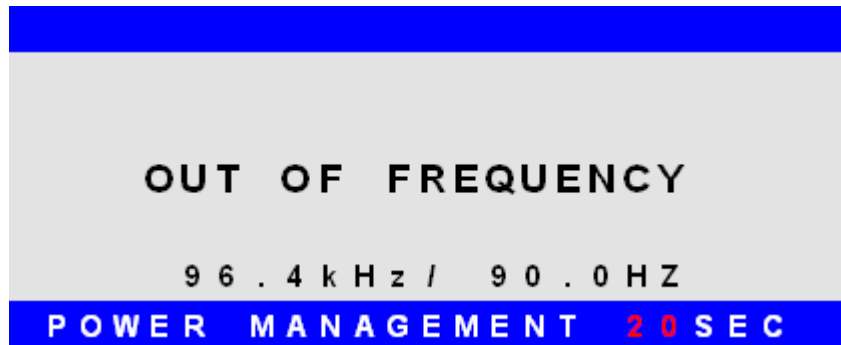
### NO SIGNAL

When the monitor is first turned on it performs a set of self diagnostics. If no incoming video signal is detected immediately following self diagnostics, the following message will appear. This message will remain displayed indefinitely until a valid signal is detected. The LED remains green. The "PC" NO SIGNAL message indicates the monitor is setup to receive incoming video through the 15-pin analog VGA input connector.

```
SELF  DIAGNOSTICS

PC
NO SIGNAL

CHECK THE SIGNAL CABLE
```

The "DIGITAL" NO SIGNAL message indicates the monitor is setup to receive incoming video through the DVI-D input connector.

```
SELF  DIAGNOSTICS

DIGITAL
NO SIGNAL

CHECK THE SIGNAL CABLE
```

**POWER SAVER MODE**

The following message appears when the monitor is on but in DPMS (Display Power Management Signaling) mode. This occurs after a valid incoming video signal is no longer preset or when the PC has signaled the monitor to enter the POWER SAVER MODE. The message is displayed for 5 seconds and then removed. The LED remains amber. The "PC" POWER SAVER MODE message indicates the monitor is setup to receive incoming video through the 15-pin analog VGA input connector.

<div align="center">

**PC**

**POWER SAVER MODE**

</div>

The "DIGITAL" POWER SAVER MODE message indicates the monitor is setup to receive incoming video through the DVI-D input connector.

<div align="center">

**DIGITAL**

**POWER SAVER MODE**

</div>

**PROCESSING AUTO CONFIGURATION**

The following message appears when the monitor is performing an automatic self configuration. An auto configuration can be initiated by pressing the SELECT button with no OSD screen being displayed or by selecting the AUTO ADJUST option from the POSITION OSD menu.

<div align="center">

**PROCESSING**

**AUTO CONFIGURATION**

</div>

# Appendix

## Video Input Pin Assignment

**DVI-D**

| Pin No. | Name | Description |
|---------|------|-------------|
| 1 | TMDS DATA2- | TMDS DATA2 Differential Negative Signal |
| 2 | TMDS DATA2+ | TMDS DATA2 Differential Positive Signal |
| 3 | TMDS DATA2 Shield | Shield for TMDS Channel #2 |
| 4 | N.C. | No Connection |
| 5 | N.C. | No Connection |
| 6 | DDC Clock | The Data Line for the DDC Interface |
| 7 | DDC Data | The Clock Line for the DDC Interface |
| 8 | N.C. | No Connection |
| 9 | TMDS DATA1- | TMDS DATA1 Differential Negative Signal |
| 10 | TMDS DATA1+ | TMDS DATA1 Differential Positive Signal |
| 11 | TMDS DATA1 Shield | Shield for TMDS Channel #1 |
| 12 | N.C. | No Connection |
| 13 | N.C. | No Connection |
| 14 | +5V Power | +5 Volt signal for EDID |
| 15 | GND (+5V Return) | Ground for +5 Volt Power |
| 16 | HPD | Hot Plug Detect |
| 17 | TMDS DATA0- | TMDS DATA0 Differential Negative Signal |
| 18 | TMDS DATA0+ | TMDS DATA0 Differential Positive Signal |
| 19 | TMDS DATA0 Shield | Shield for TMDS Channel #0 |
| 20 | N.C. | No Connection |
| 21 | N.C. | No Connection |
| 22 | TMDS CLOCK Shield | Shield for TMDS Clock Differential Pair |
| 23 | TMDS CLOCK+ | TMDS CLOCK Differential Positive Signal |
| 24 | TMDS CLOCK- | TMDS CLOCK Differential Negative Signal |

**Analog 15- Pin D-Sub**

| Pin No. | Name | Description |
|---------|-------|-------------------|
| 1 | Red | Red Analog Data |
| 2 | Green | Green Analog Data |
| 3 | Blue | Blue Analog Data |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | GND | Ground |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | N.C. | No Connection |
| 10 | GND | Ground |
| 11 | GND | Ground |
| 12 | DSDA | DDC Serial Data |
| 13 | HSYNC | Horizontal Sync |
| 14 | VSYNC | Vertical Sync |
| 15 | DSCL | DDC Serial Clock |

## Touch Screen Pin Assignment

**Serial RS-232**

| Pin No. | Name | Description |
|---------|------|-------------|
| 1 | DCD | Data Carrier Detect |
| 2 | RX | Receive Data |
| 3 | TX | Transmit Data |
| 4 | DTR | Data Terminal Ready |
| 5 | GND | Ground |
| 6 | DSR | Data Set Ready |
| 7 | RTS | Request To Send |
| 8 | CTS | Clear To Send |
| 9 | RI | Ring Indicator |

| | |
|---|---|
| Baud Rate | 9600 |
| Data Size | 8 Bits |
| Stop Bits | 1 Bit |
| Parity | No Parity (Only) |
| Handshaking | Hardware CTS/RTS |

**USB**

| Pin No. | Name | Description |
|---------|------|-------------|
| 1 | VBUS | +5V Power |
| 2 | USB_D− | USB Data − |
| 3 | USB_D+ | USB Data + |
| 4 | GND | Ground |

USB-B CONNECTOR ON
REAR OF MONITOR
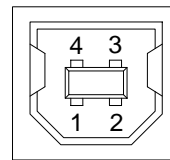
*Note:* **The touch controller receives it power from the monitor's internal power supply – not through the USB conn**

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