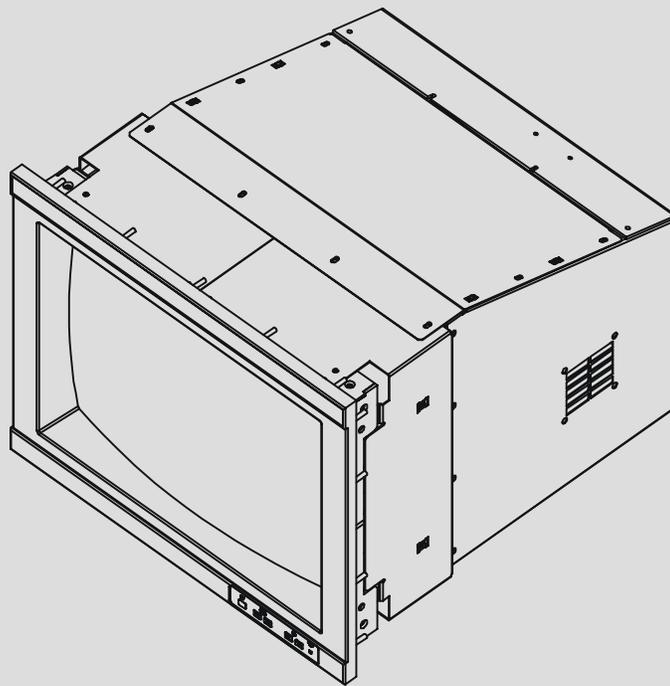


Industrial 20" CRT Monitor

 **Allen-Bradley**

(Bulletin 6157)

Installation and User Manual



**Rockwell
Automation**

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Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Controls" (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation with respect to use of the information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation is prohibited.

Throughout this manual, we use notes to make you aware of safety considerations.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is especially important for successful application and understanding of the product.

Industrial 20" CRT Monitor

Description

The Bulletin 6157 20" Industrial CRT Monitor is a general purpose monitor suitable for a wide range of industrial computing applications. It offers the following features:

- Versatile multi-sync interface (640 x 480 to 1280 x 1024 resolution)
- High-contrast INVAR mask tube
- Reliable and rugged industrial design
- Durable NEMA 4/4X/12 front panel
- Fully-integrated digital design
- Microprocessor communications port for remote control of all monitor functions.



ATTENTION: The equipment described in this document generates, uses, and emits radio frequency energy. The equipment has been tested and found to comply with FCC Rules, Part 15, subpart J, for Class A computing devices.

The use of non-shielded interface or power cords with Allen-Bradley industrial monitors is prohibited.



ATTENTION: X-ray emissions from these monitors are typically about 0.05 mR/hr maximum, well below the 0.5 mR/hr maximum recommended by the US. Department of Health and Human Resources and specified in "Federal Performance Standards for Television Receivers", Section 10, Part 1020, Title 21, of the U. S. Code of Regulation (PL90-620), Vol. 38, No. 198.

These monitors are equipped with X-ray protection circuits which cause automatic shutdown of the equipment in case its X-ray emissions begin to approach Federal limits.

Available Options

The following options are available to the 6157 Industrial Monitor:

- Video interface options (HD-15, 5 BNC)
- Touchscreen options (resistive, capacitive)
- Touchscreen cable options
- Video cable options
- Power cord options
- Magnetic shield options

Package Contents

The monitor shipping carton contains the following items:

- Monitor
- Package of mounting hardware
- AC power cord (optional)
- Video cable (optional)
- This user manual

A 6157 Industrial Monitor with a touchscreen option is shipped with these additional items:

- Supporting software and manuals
- RS-232 serial extension cable (optional)

Unpacking the Unit

Before unpacking a new monitor, inspect the shipping carton for damage. If damage is visible, immediately contact the shipper and request assistance. Otherwise, proceed with unpacking.

Note: Make sure you keep the original packaging for the monitor in case you need to return the monitor for repair.

Installing the 6157 Industrial Monitor

This section describes how to install the monitor.

Tools Needed

In addition to the tools required to make the cutout, you will need the following tools:

- 3/8" Deep Well Socket
- 1/4" Drive Extension - 12" or longer
- 1/4" Drive Ratchet or 1/4" Drive Torque Ratchet

Before Installation

When installing the unit, it is important to consider environmental factors at the site that could affect performance as well as possible effects from equipment operation on personnel and nearby equipment.

Following the guidelines will help ensure that the monitor will provide safe and reliable service.

- Ensure that sufficient **power** is available from a single phase AC outlet at the site.
- Ensure that sufficient **space** is available around air inlets and outlets to provide the circulation necessary for cooling. Never allow air passages to become obstructed. The monitor is equipped with a fan to ensure proper cooling.
- **Dust and smoke** particles can cause problems, since they can collect at ventilating holes in the enclosure and interfere with cooling. Accordingly, where dust and smoke are problems it is especially important to keep air vents clean. Refer to the Routine Maintenance section (Page 20) for more information.
- Ensure that the **ambient air temperature** will not exceed the specified maximum temperature. A user supplied fan, heat exchanger or air conditioner may be required to meet this condition in some installations.
- Leave the monitor's **enclosure or cover** in place at all times during operation. The cover affords protection against high voltages inside the monitor and inhibits radio-frequency emissions that might interfere with other equipment.
- The Federal Communications Commission has prepared a pamphlet that addresses the problem of **radio frequency interference** to radio and television reception, which should be consulted in case of problems with such interference. This publication, "How to Identify and Resolve Radio/TV Interference Problems" (Stock #004-000-00345-4) may be obtained from the US. Government Printing Office, Washington, DC 20402.

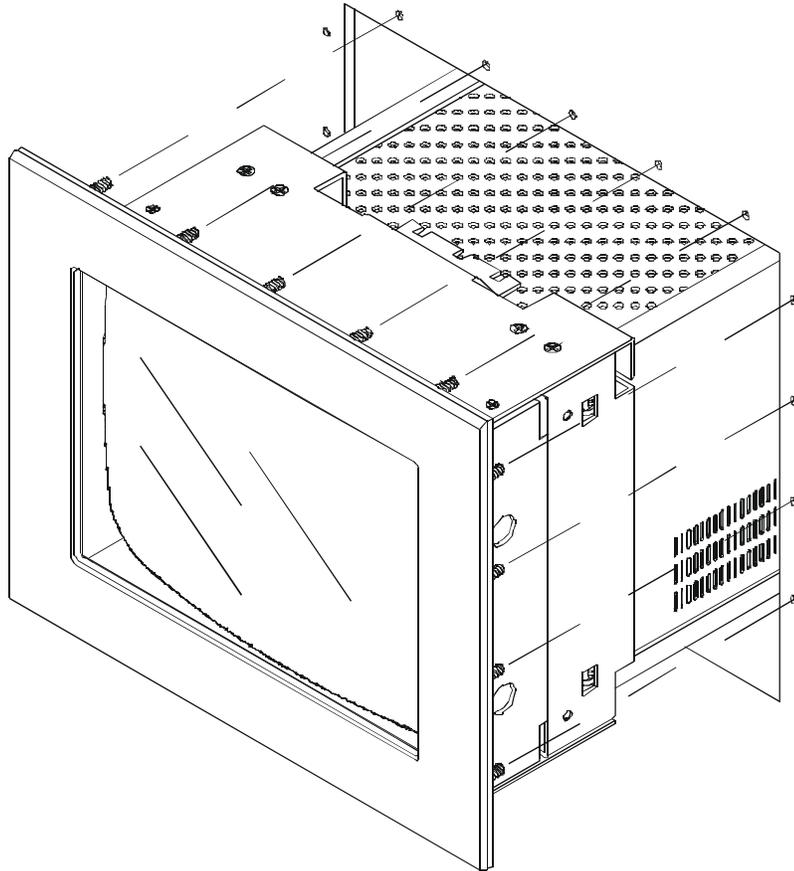
- Determine the minimum and maximum ambient **humidity** for the monitor by consulting the specification sheets at the back of this manual. Ensure that the humidity of the ambient air will not exceed these limits. In very dry environments, static charges build up very readily. Proper grounding of the equipment through the AC power cord can help reduce the likelihood of static discharges, which may cause shocks and damage electronic components.

Panel Mounting

When properly installed, the 6157 Industrial Monitor is designed to provide protection against water and dust to NEMA 4, NEMA 4X (plastic panel), and NEMA 12 standards.

No slides or shelves are required because the 6157 Industrial Monitor is designed to be supported by the panels in which it is installed.

Figure 1
Generic Panel Mount Diagram



Panel Mounting Guidelines

Observe the following precautions before installing the unit in a panel:

- Confirm that there is adequate space behind the panel. Remember to allow extra space (3 in. (76.2 mm) behind and 1 in. (25.4 mm) below and on each side) for air circulation.
- Confirm that the cabinet is deep enough to accommodate the monitor's depth while providing rear clearance for airflow. A cabinet with depth of 23.11 in. (587 mm) is sufficient.
- Take precautions so that metal cuttings do not enter any components that are already installed in the panel.
- Supporting panels should be at least 14 gauge to ensure proper sealing against water and dust and to provide proper support. The mounting hardware supplied accommodates panels up to 0.25 in. (6.35 mm) thick.

Note: Supporting panels must be cut and drilled to specifications prior to installation.

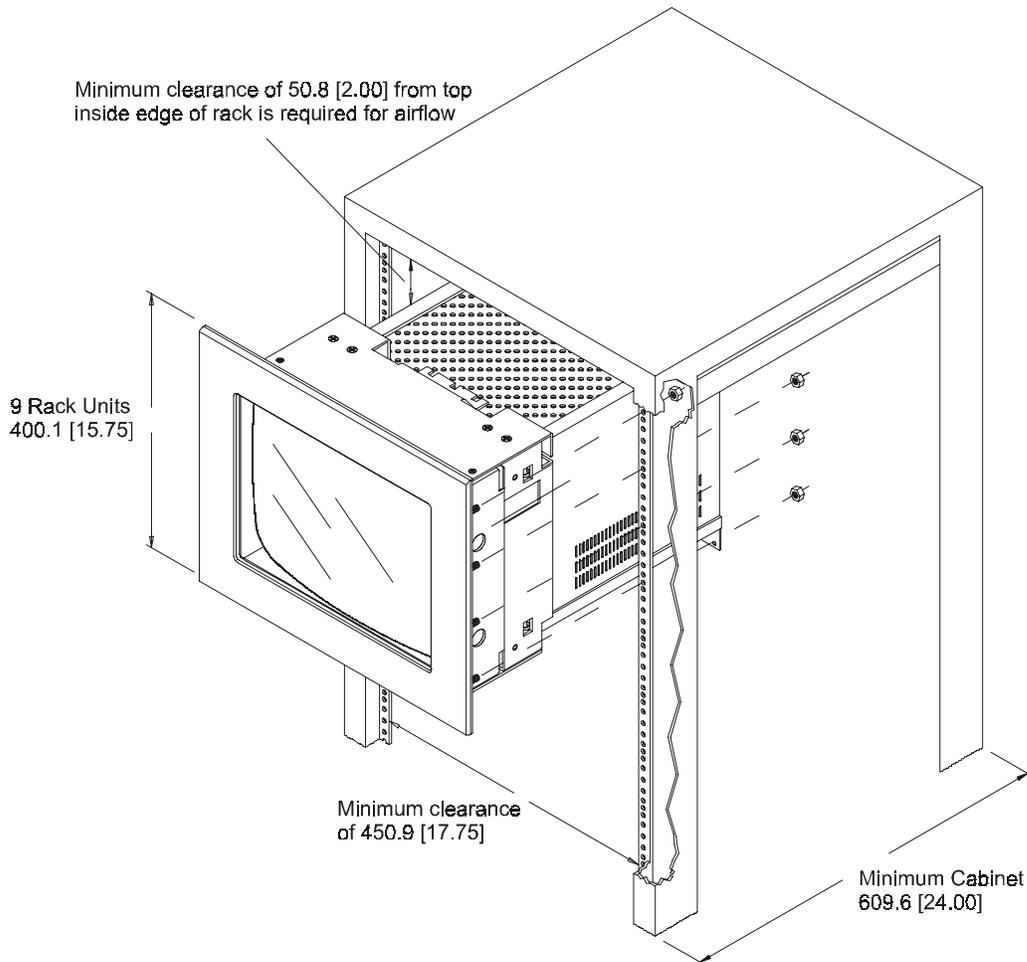


ATTENTION: Failure to follow these warnings may result in personal injury or damage to the panel components.

Mounting the 6157 Industrial Monitor in a Rack

Due to the front panel size and stud pattern, the 6157 Industrial Monitor can be installed in an EIA 19" 9U panel standard rack. Refer to the following figure:

Figure 2
Generic Rack Mounting Diagram

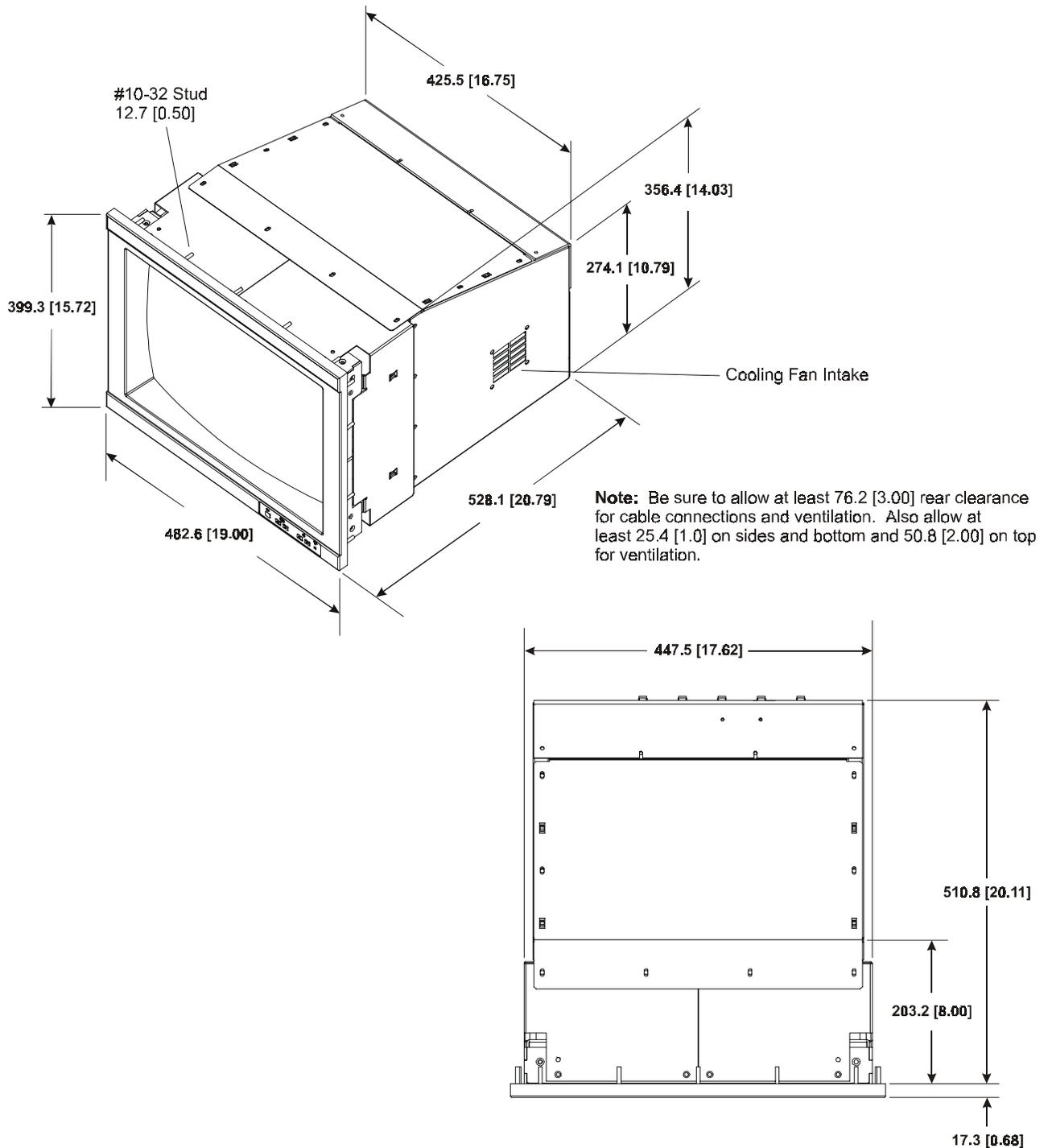


Important: If you install the 6157 Industrial Monitor in a rack, you must ensure that the rack can support the weight of the monitor.
You might need to install a support or shelf under the rear of the monitor to support the weight.

Dimensions

This section provides diagrams you need to follow to install the unit.

Figure 3
6157 Industrial Monitor Dimensions

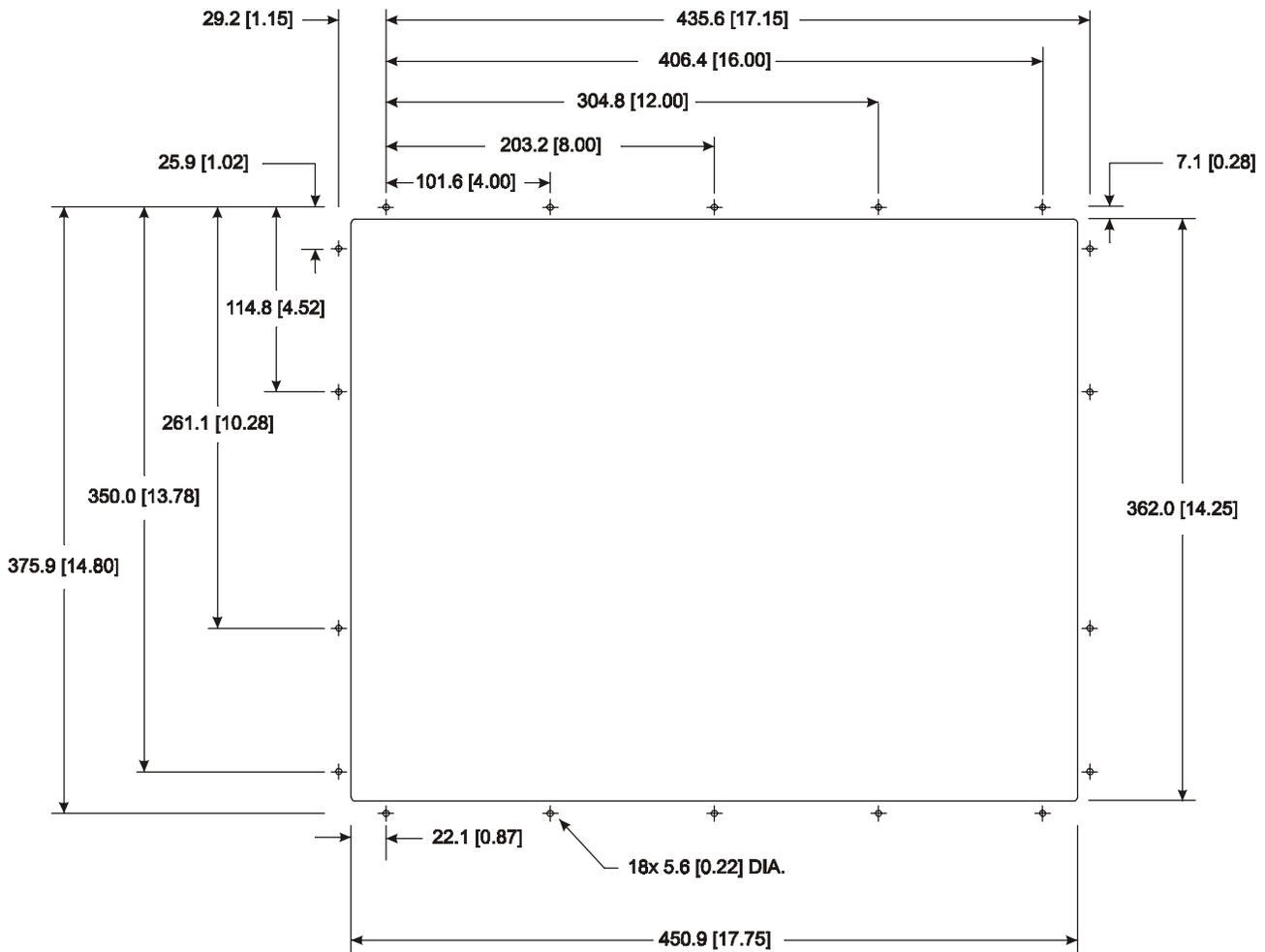


Panel Mounting Procedure

1. Confirm that the shipping carton contains a package of 20 10-32 lock nuts and 20 flat washers. You will need 18 nuts and washers for installation.
2. Refer to the physical dimension drawing (Figure 3) and confirm that there is adequate space behind the panel. Remember to allow extra space for circulation and cabling.
3. Refer to the panel cutout drawing below for dimensions of the panel cutout and mounting hole locations. Cut and drill the panel.

Note: Use #10-32 or M5 self-locking nuts for mounting.

Figure 4
Panel Mounting Cutout



- Carefully remove the monitor from its packaging. Avoid damaging the monitor gasket.



Tip: It will be easier to install the monitor if you support it with a shelf or other support adjusted to the appropriate height.

- Insert the monitor in the panel cutout from the front. Do not damage the threaded mounting studs as you position the monitor.
- Secure the unit with the lock nuts and washers provided. Tighten evenly to 24 inch-pounds of torque.

Important: To ensure a proper seal, be sure to install a washer and nut on each of the 18 mounting studs.



ATTENTION: Mounting nuts must be tightened to a torque of 24 inch-pounds to provide panel seal and avoid potential damage. Rockwell Automation assumes no responsibility for water or chemical damage to the monitor or other equipment within the enclosure due to improper installation.

- Remove the protective adhesive sheet from the screen of the Industrial Monitor. The sheet is designed to prevent scratching of the polycarbonate screen protector or the optional touchscreen during shipping and installation. It should be removed before use.

Connecting the 6157 Industrial Monitor

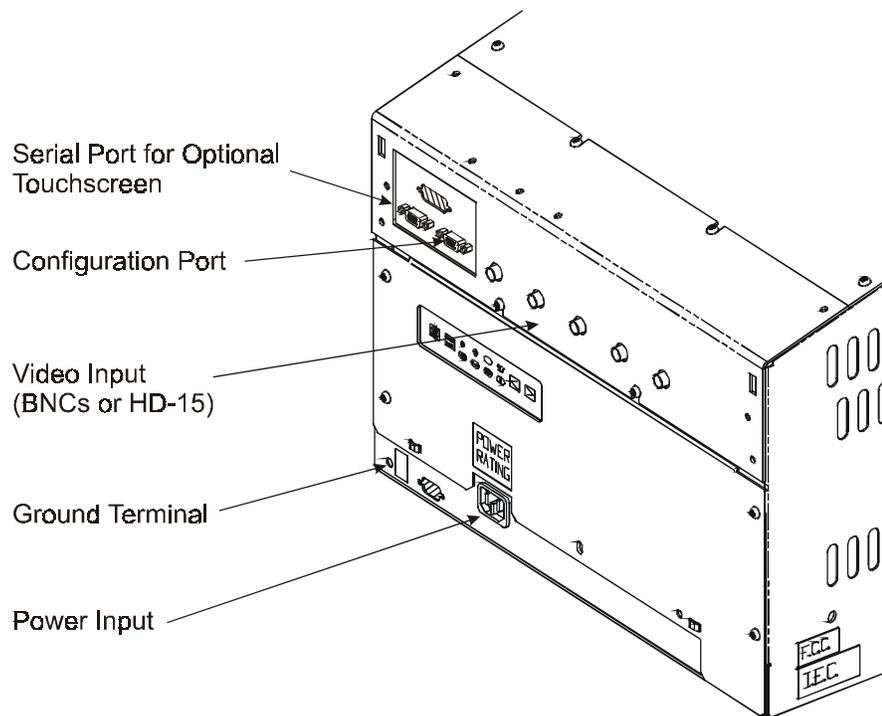
The rear panel of the 6157 Industrial Monitor has connectors for attaching cables to accomplish the following:

- Connecting to a host video source (HD-15 VGA or BNC connectors)
- Connecting to a host touchscreen control port (DB-9 connector) (optional)
- Connecting to AC power

Note: Some connectors on your monitor may differ from the following figure.

The following figure illustrates the standard configuration for the 6157 Industrial Monitor.

Figure 5
Rear Panel



Connecting the Video Source

The video connection to the host is made through a HD-15 (female) connector or through BNC input connectors.

To establish a signal using the HD-15 connector:

Note: For more information on using an HD-15 video cable to connect to the host computer, refer to Appendix B (Page 28).

1. Obtain a shielded, properly terminated video cable of length as short as possible. Longer cables (up to approximately 50 feet in some cases) may be used, provided they are properly constructed. Your package may include a six-foot video cable, if specified.
2. Connect one end of the cable to the female HD-15 video input connector on the rear panel of the monitor.
3. Connect the other end to the output of any IBM-compatible VGA adapter or other video generator.

Note: You may connect the monitor to video generators that do not conform to VGA standards. The main requirement is that the generator provide analog RGB video signals (0.714V above reference black into 75 ohms) and separate horizontal and vertical sync signals.

To establish a signal using the BNC connectors:

Note: For more information on using BNC connectors, refer to Appendix B (Page 29).

1. Obtain 75 ohm coaxial cables fitted with BNC connectors. Make sure the cables are of equal length.

Note: An HD-15 to BNC video cable is available from Rockwell Automation for connecting the monitor to a VGA video source.

2. Connect one end of the cable to the appropriate BNC input connectors (R, G, B, HS/CS, VS) on the rear panel of the monitor.
3. Connect the other end to the corresponding output of any video source. For example, connect the red output cable from the host to the red input connector on the monitor.

Connecting the Configuration Port

The 6157 Industrial Monitor is equipped for remote control by the host computer. You can use the serial configuration port to provide bi-directional communication between the monitor and the host computer. The host computer can send commands to the monitor requesting information about the monitor's status or to adjust monitor operating conditions.

Note: Please contact Technical Support for more information on using the configuration port.

To connect the configuration port:

1. Obtain a "straight" wired serial cable (RS-232) with a 9-pin D-shell connector.
2. Connect one end of the serial cable to the CONFIG port connector on the rear of the monitor.
3. Connect the other end to any serial communications port on the host computer.
4. Tighten the captive screws on the cable connector to secure it.

Connecting the Touchscreen Interface

The serial touchscreen interface connection to the host is made through an RS-232 DB-9 (female) connector located on the rear panel.

The optional touchscreen provides a high-resolution touch input system. Driver software included with the package allows the touchscreen to function with many popular DOS and Windows®-based industrial applications as a pointing device (mouse).

Note: Refer to the manual included with the touchscreen option and Appendix A of this manual (page 25) for additional details on the installation and operation of the touchscreen.

To connect the touchscreen:

1. For units with the touchscreen option, make sure you have one of the optional serial cables.
2. Connect one end of the touchscreen serial cable to the T/S port connector on the rear of the monitor.
3. Connect the other end to any serial communications port on the host computer.
4. Tighten the captive screws on the cable connector to secure it.

Connecting AC Power

The 6157 Industrial Monitor requires a single phase power supply providing 90 to 264V AC at 47 to 70 Hz. Power must be available at a grounded three-pin outlet located nearby. Whenever possible, connect the monitor to the same AC source that supplies the computer.

To connect AC power to the monitor:

1. Turn off the main switch or breaker.
2. Use the ground terminal of the monitor to establish a chassis-to-earth ground connection. Secure one end of a ground strap to the ground terminal. Connect the other end of the ground strap to a good earth ground.

The ground terminal is an M5 screw.



ATTENTION: Chassis ground must be connected for safe operation of the monitor. The AC receptacle on the monitor is a 3-wire type with chassis ground pin, and the mating AC cord supplied is a 3-wire type, designed for connection to a grounded 3-pin AC outlet. However, a properly ground AC outlet is not always available, and grounding using a 3-wire cord can easily be defeated. If you fail to ground the monitor properly, the setup may result in personal injury from electrical shock or damage to the equipment.

3. Connect the socket end of the AC power cord to the mating connector on the rear panel of the monitor.
4. Connect the plug end of the AC power cord to the main outlet.
5. Restore AC power to the outlet.

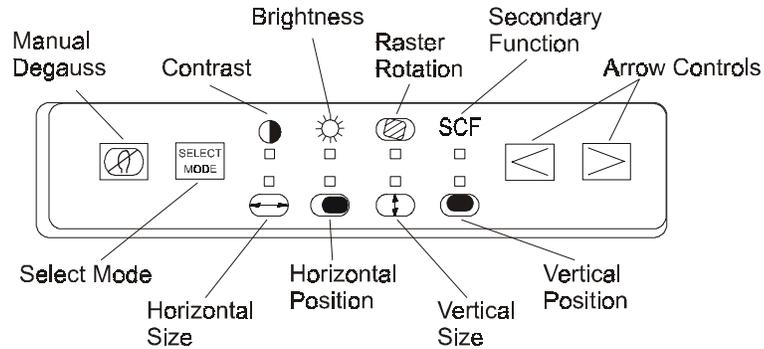
Operating the 6157 Industrial Monitor

This section describes how to operate the 6157 Industrial Monitor.

Controls

The following is a summary of the controls and indicators on the membrane keypad on the 6157 Industrial Monitor:

Figure 6
Monitor-Resident Controls



Note: The number of controls supported by the monitor may vary depending on the monitor type or customer-specified options.

Status LED Indicators

The keypad includes seven green LED indicators and one amber LED indicator. These provide information about the current status of the monitor.

When the monitor is operating in normal mode, one of the green LEDs will be lit. The monitor indicates an error condition if more than one green LED is lit, or if only the amber SCF LED is lit.

Note: For information on troubleshooting the 6157 Industrial Monitor, refer to Page 23.

Saving Changes

When you finish adjusting the monitor's settings, the monitor automatically saves your changes. Approximately 20 seconds after you stop pressing controls, the amber SCF LED blinks twice to indicate that your changes were saved.

Manual Degauss

The monitor is equipped with an automatic degaussing system to remove residual magnetism from the CRT's shadow mask at power-up. Degaussing helps keep the screen free of any color impurities which might otherwise result from magnetism picked up by the shadow mask from the earth's magnetic field when the monitor is moved.

In addition, a **degauss** push button is provided on the control panel. This manual control can be used if color impurities appear on the screen while the monitor is in operation.

Note: The internal degauss will not prevent color impurities caused by local magnetic fields. Metal enclosures can easily become magnetized by welding and machinery operations.

Use a hand held degaussing coil to remove residual magnetism from the enclosure.



Tip: For best results, perform a manual degauss only after allowing at least 15 minutes to pass following power-up or a previous manual degauss.

Brightness and Contrast

The 6157 Industrial Monitor is equipped with adjustable **brightness** and **contrast** controls. These controls are located on the front panel of the unit.

To obtain the best display, first set the brightness control to the appropriate setting under the lighting conditions in which the monitor will be used. Then adjust the contrast control to increase or decrease the intensity of the video image as required.

To set the brightness and contrast controls:

1. Press the Select Mode button until the status LED indicator below the Brightness icon is lit.

Note: For best results, display a screen image with a large black area before setting these controls.

2. Use the left arrow button to adjust the brightness value to its lowest setting.
3. Use the right arrow button to adjust the brightness until the black colors in the screen image change from black to dark gray.

4. Use the left arrow button to lower the brightness until the dark gray colors change back to black. This is the optimal brightness setting given the current lighting conditions
5. Press the Select Mode button until the status LED indicator below the Contrast icon is lit.
6. Use the left and right arrow buttons to change the value for the contrast control to achieve the appropriate level of intensity in the image.

Horizontal and Vertical Size and Position

The monitor is factory preset and normally requires no manual adjustment for vertical or horizontal alignment. However, four adjustable **size** and **position** controls are provided to permit adjustment if it should become necessary.

To change size or position:

1. Press the Select Mode button until the status LED indicator below the appropriate icon is lit.
2. Use the left and right arrow buttons to change the value for the selected control.

Raster Rotation

A raster rotation control allows for corrections to any display misalignment which might be present as a result of interaction between the monitor and an external, low-level uniform magnetic field, such as the earth's magnetic field.

All CRT displays are affected by the earth's magnetic field and by similar low level uniform fields. Generally, the effects of such a field on the display vary with the display's spatial orientation relative to the field lines. For example, when the unit's screen is facing west, the effects of the earth's field are minimal. When the screen is rotated toward the north or south, the display can exhibit a small amount of rotation, so that its top and bottom edges are no longer parallel to the edges of the panel.

Note: This effect is different from the effect of magnetism on the shadow mask, which takes the form of color impurity and is corrected by the degaussing system.

Before making any adjustments, display a full screen image and check for rotation (top or bottom edge of the image out of parallel with the corresponding edge of the panel).

To change raster rotation:

1. Press the Select Mode button until the status LED indicator below the raster rotation icon is lit.
2. Use the left and right arrow buttons to adjust the rotation.

Important: The raster rotation control cannot correct for the effects of external AC fields such as those produced by large motors, generators and transformers. Such effects often take the form of display jitter. Protection against this kind of magnetic interference requires special shielding.

Secondary Control Function Mode (SCF) for Vertical Pincushion 

The 6157 Industrial Monitor allows you to adjust the vertical pincushion to straighten the sides of the screen. You adjust the vertical pincushion by switching the monitor to secondary control function mode.

To change the vertical pincushion:

1. Press the arrow buttons simultaneously to enter secondary control function mode.

The SCF status LED indicator and the brightness LED indicator are lit to indicate secondary control function mode.

2. Use the left and right arrow buttons to adjust the value.

Note: To best observe the effects of the vertical pincushion adjustment, display an appropriate full-screen image on the monitor.

3. Press the arrow buttons simultaneously to exit secondary control function mode.

Routine Maintenance

Cleaning

Occasionally clean the display panel and cabinet with a soft cloth dampened (not soaked) with a mild (non-abrasive) glass cleaner. Keep turning a fresh side of the cloth toward the screen surface to avoid scratching it with accumulated grit.

Note: The solvent should be applied only to the cloth, and not directly on the monitor screen.
Do not use paper products as they may scratch the surface.
To minimize the risk of abrasion, allow the screen to stand dry.

Special care should be taken when cleaning a resistive touchscreen or polycarbonate shield that is installed over the screen. Abrasive and certain chemical cleaners can easily damage the surface. Never use alcoholic or ammoniac cleaners.

Fuse Replacement

The Bulletin 6157 Industrial Monitor is equipped with two AC line fuses housed in the IEC connector (2.5A 250V). To access the fuses, you must remove the rear cover of the unit.

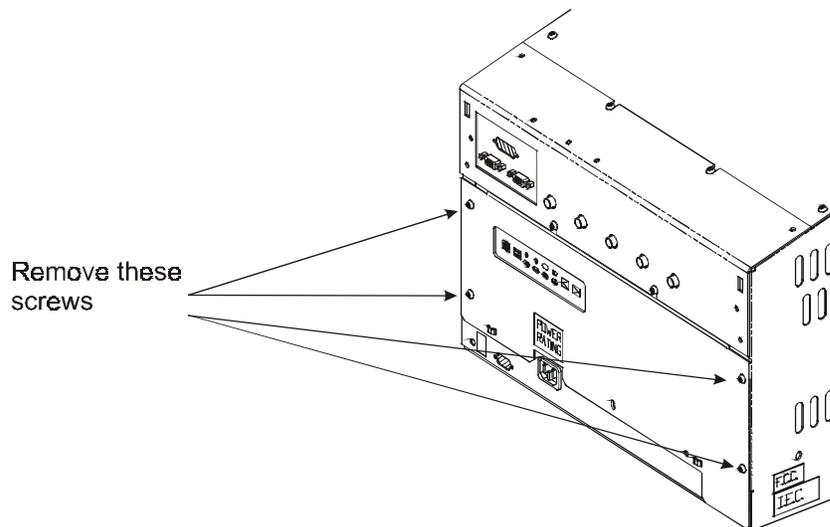


ATTENTION: Fuse replacement requires work in areas that can present dangerous voltages. Always disconnect the AC power cord and wait one minute before attempting fuse replacement. Replace the rear cover before restoring power to the monitor.

To replace the fuses:

1. Disconnect the power cord and remove all other cables attached to the monitor.
2. Remove the four screws that secure the rear panel of the monitor using a Philips screwdriver. Refer to the following figure.

Figure 7
Fuse Replacement



3. Remove the rear panel to expose the rear section of the AC input connector. Pull off the plastic cap, situated at the rear of the AC connector, to expose the fuses.

4. Remove each fuse by inserting the tip of a small flat-bladed screwdriver between the fuse clip and the metal end cap of the fuse and gently prying the fuse out of its clip.
5. Replace each fuse as required with a 5ST Slo-Blo type fuse rated at 2.5A, 250VAC.
6. After replacing each fuse in its clip holder, reinstall the plastic cover over the fuses, reinstall the rear panel of the monitor, and reconnect the AC power cord.

Note: If a fuse continues to blow, consult a qualified service technician.



ATTENTION: To avoid danger of fire, always replace the fuse with one of the same type and rating.

Replacing a Line Cord

To avoid shock and fire hazards, the monitor's power cord should be replaced if the insulation becomes broken or if it develops a loose internal connection.

Other Maintenance

Qualified service personnel should perform all maintenance, except for the fuse and power cord replacement described above.

Troubleshooting

You can refer to this table to help identify the cause and offer a solution to a problem. This table lists typical problems you may encounter.

Table A
Troubleshooting Table

Symptom	Possible Problem	Action
None of the status LEDs are lit.	Power cord not connected.	Open power switch. Reconnect power cord at monitor and at AC outlet. Close power switch.
	No power available at AC outlet.	Test AC outlet by plugging in a lamp or other known good device.
	Blown fuse.	Replace fuse. Refer to Page 21.
	Power cord faulty.	Replace power cord. Refer to Page 22.
	Monitor faulty.	Have monitor serviced.
One green status LED is lit, but no screen image when power switch is closed.	Screen saver activated.	Disable screen saver by activating an input to the host system.
	Brightness and contrast controls not properly adjusted.	Adjust brightness and contrast controls.
More than one green status LED is lit, but no screen image.	Monitor out of adjustment.	Turn monitor OFF and then turn back ON.
The amber SCF status LED is lit and one green status LED is lit.	Monitor is in secondary control function mode.	Press both arrow buttons simultaneously to exit secondary control function mode. Refer to Page 19.
Only the amber SCF status LED is lit, and no screen image.	Monitor not synched to video source.	Check for proper video cable installation. Replace suspected faulty cable. Check to ensure that video source is operating within the monitor's range.
	Monitor faulty.	Have monitor serviced.
No raster visible even when brightness and contrast controls are set full ON.	Monitor out of adjustment or faulty.	Have monitor serviced.
Raster dimly visible with brightness and contrast controls set full ON, but no display present	Video cable problem.	Check for proper installation of video cable(s). Refer to installation instructions. Replace suspected faulty cable(s).
	Fault in video source.	Test video source by connecting to another monitor that is known to be operational.
	Fault in monitor.	Have monitor serviced.
Display is present, but garbled or rolling	Monitor not synched to video source.	Refer to installation instructions. Check for proper video cable installation. Replace suspected faulty cable. Check to ensure that video source is operating within the monitor's range.
Display is present and stable, but appears "wrapped" at one side or otherwise not properly centered or sized.	Size and position controls not properly adjusted.	Adjust controls for proper size and position of display. Refer to operator instructions

Symptom	Possible Problem	Action
Display is present and stable, but missing some color(s)	Video cable problem.	Check for proper video cable installation. If using BNC inputs, test monitor as follows. Disconnect signal cable(s) corresponding to the missing color(s). Disconnect signal cable corresponding to a displayed color and connect it to the input(s) corresponding to the missing color(s). If a missing color reappears, the signal cable corresponding to that color is faulty; otherwise, the monitor is faulty. Replace suspected faulty cable.
	Fault in monitor.	Have monitor serviced.
Display is present and stable, but colors are not pure	Monitor requires degaussing.	Manually degauss the monitor. Refer to Page 17.
	Enclosure requires degaussing.	Manually degauss the enclosure. Refer to Page 17.
Display is present, but "jitters" or is severely distorted NOTE: Do not confuse the flicker associated with an interlaced video mode with jitter.	Interfering external AC or DC magnetic shield	If possible, reposition the monitor beyond the proximity of large transformers, motors, bus bars, etc. Ask Rockwell Automation about various shielding options available to protect the monitor.
Display is present, but "bars" appear across it.	"Noise" generated by other equipment in the environment is present at the video inputs	Consult the application note which discusses method's of eliminating noise.
Connected monitor to computer. When powered, the PC locked up (For units using the HD-15 only)	Graphics card driver is not compatible with monitor	Update the graphics card drivers to the latest version.

Appendix A: Touchscreen Serial Interface

Description

All touch controllers are configured by default to provide serial communications at 9600 baud, 8 data bits, 1 stop bit, no parity.

For Allen-Bradley monitors equipped with touchscreens, a serial communications cable is required. A suitable cable can be obtained from Rockwell Automation or you can create one.

The cable provides a communications channel between the touchscreen controller, which is mounted inside the monitor, and an RS-232-C serial port on the host computer. Because the touch controller obtains power from the monitor's power supply, no external touch power connections are necessary.

Software supplied with the touchscreen must be loaded on the host computer to handle communications with the touch controller over the channel.

Because the touchscreen emulates a mouse, there may be compatibility issues involving how the touchscreen emulates mouse buttons, especially multiple buttons. For a complete discussion of these issues and how to troubleshoot them, refer to the touchscreen documentation.

Setting Up the Touchscreen Interface

This section describes how to set up the touchscreen system using the 6157 Industrial Monitor. Setup involves the following:

- Enabling the touchscreen interface
- Installing the software on the host computer that will handle communications with the touchscreen controller
- Performing a calibration

Enabling the Touchscreen Interface

The 6157 Industrial Monitor provides a female DB-9 connector on the rear panel. This connector provides the serial interface for the touch controller.

Interconnecting wiring to the host serial port connection is shown in the following table.

Table B
Touchscreen Interface

Monitor (DCE Device) DB-9 (Female)	Signal Description	Host (DTE Device)	
		DB-9 (Male)	DB-25 (Male)
1	Not Connected (DCD)	1	8
2	Transmit Data (TXD)	2	3
3	Receive Data (RXD)	3	2
4	Data Terminal Ready (DTR)	4	20
5	Common Signal Return (SG)	5	7
6	Not Connected (DSR)	6	6
7	Request To Send (RTS)	7	4
8	Clear To Send (CTS)	8	5
9	Not Connected	9	22

Installing the Touchscreen Driver Software

To install the touchscreen driver software correctly, obtain the following information about the host hardware:

- The COM port in use for the touchscreen. Ensure that the RS-232 cable is properly installed between the monitor port and the host's COM port.
- The baud rate at which the controller is operating. You will need to match the baud rate at the COM port. The controller baud rate is factory set at 9600.

Note: If you are using older touchscreen software, you may be prompted for the type of touchscreen controller being used. The 6157 uses the following controllers:

- Resistive: Elo TouchSystems model E271-2210.
- Capacitive: MicroTouch model SMT-3.

Once you have obtained this information, install the software using the installation disks found in the touchscreen accessory package.

Note: Before installation, you may want to check the touchscreen manufacturer's site on the World Wide Web for the latest software drivers. Enter these addresses in your Internet browser:

- www.elotouch.com for resistive touchscreens
- www.microtouch.com for capacitive touchscreens.

Performing a Calibration

After installing the driver software, follow the instructions in the touchscreen documentation.

Following installation of the touchscreen software and calibration, the touchscreen is ready to use.

Appendix B: Video Cables

You can use two types of video cable connectors to connect the 6157 Industrial Monitor to the host computer:

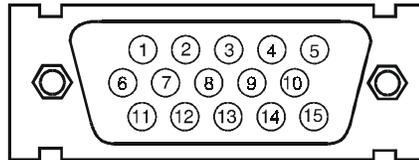
- HD-15 connectors
- BNC connectors.

HD-15 Connectors

The HD-15 video cable you use with this monitor is equipped with a conventional HD-15 connector at each end.

Note: The following figure is the view looking into the pin end of the male connector or solder term end of the female connector.

Figure 8
HD-15 Video Connector



The following table provides the pin numbers and corresponding pin assignments for the HD-15 video connector with the DDC2B capability:

Table C
Standard HD-15 Video Cable

Monitor HD-15 (Female)	Signal Description	Host HD-15 (Male)
1	Red Video	1
2	Green Video	2
3	Blue Video	3
4	Return	4
5	Not Used	5
6	Red Video Ground	6
7	Green Video Ground	7
8	Blue Video Ground	8
9	+5V (Optional)	9
10	Sync Ground	10
11	Return	11
12	Bi-Directional Data	12
13	Horizontal Sync	13
14	Vertical Sync (VCLK)	14
15	Data Clock (SCL)	15

BNC Connectors

The BNC cables you use with this monitor use a combination of three or more BNC connectors. The rear panel of the monitor contains five BNC connectors:

- **R, B, and G:** Red, Green, and Blue input connectors to establish color. These are used for RS-343 analog signals.
- **HS/CS:** Separate horizontal/composite sync signal from the video source.
- **VS:** Separate vertical sync signal from the video source.

The following table describes the signal types you can use with these BNC connectors:

Table D
BNC Signal Types

BNC Signal Type	Description	R	G	B	HS/ CS	VS
Sync-on-Green	Use the three video connectors. Horizontal and vertical syncs are supplied on the green video line.	X	X	X		
Separate Composite Sync	Use the three video connectors plus the horizontal sync/composite sync input.	X	X	X	X	
Separate Horizontal and Vertical Sync	Use the three video connectors plus the horizontal sync/composite sync and vertical sync input.	X	X	X	X	X

Specifications

Display	
CRT Type	20" diagonal, 0.28mm dot pitch SP phosphor, 51.5% glass, AGRAS coating, low thermal expansion shadow mask, DAF electron guns, tension-band implosion protected
Degaussing	Manual and automatic
Nominal Display Area	
(4:3 aspect) Horizontal	14.7in. (374mm)
(4:3 aspect) Vertical	11.0in. (280mm)
(5:4 aspect) Horizontal	13.8in. (350mm)
(5:4 aspect) Vertical	11.0in. (280mm)
Non Linearity (CHP Method)	
Horizontal	5% max
Vertical	4% max
Pincushion	
Horizontal	3mm max
Vertical	3mm max
Keystone	
Horizontal	1% max
Vertical	1% max
Regulation	2mm max peak deviation
Misconvergence	0.3mm max inside centered circle 280mm dia., 0.4 max outside
Luminance (typical)	30 fL, small white square
Luminance Uniformity	Corners at least 70% of center
CIE coordinates	
White	x:=0.281, y:=0.311 (9300K)
Video	
Resolution	640 x 480 to 1280 x 1024, autosync
Supported Standards	IBM VGA (640x480 at 60Hz) VESA (640x480 at 60/72Hz, 800x600 at 56/60/72Hz, 1024x768 at 60/70Hz) DEC (1024x864 at 60Hz, 1280x1024 at 66/72Hz) SUN (1152x900 at 67/76Hz) SG/IBM RISC (1280x1024 at 60Hz); IBM RISC (1280x1024 at 77Hz) HP700 (1280x1024 at 72Hz)
Horizontal Scan Rate	Variable: 30kHz to 82kHz
Vertical Scan Rate	Variable: 50Hz to 80Hz
Retrace Times	
Horizontal	2.7 usec max
Vertical	0.475 msec max
Video Bandwidth	140MHz
Black Level Stability	Within 1%
Video Input Signal	RGB analog (white level = 0.714V above ref. black, into 75 Ohms, single ended)

Video (cont.)	
Sync Input Signals	Separate Horizontal and Vertical Sync Control, TTL signal levels Sync on green (0.286V below ref. black) or Composite separate (into 75 Ohms, single ended)
Input Connection	5 BNC (R,G,B,HS/CS,VS), Female HD-15
Controls and Indicators	
	Front Panel: Degauss, Brightness, Contrast, Raster Rotation, H Size, H Pos, V Size, V Pos (sealed digital)
Operator Input	
	Touchscreen Option - Resistive touch screen, with interface controller and RS-232 interface
Environmental	
Panel Rating	NEMA 4/4x/12, designed to IP65 standards
Operating Temperature	0C to 50C
Storage Temperature	-30C to 65C
Relative Humidity	10% to 90% non-condensing
Operating Altitude	Sea level to 10,000 ft (3048m)
Non-Operating Altitude	Sea level to 40,000 ft (12000m)
Operating Electrostatic Discharge	8.0K VDC (IEC 801-2, level 3)
Non-Operating Electrostatic Discharge	20.0K VDC
Operating Shock	20g (1/2 sine, 11msec)
Non-Operating Shock	30g (1/2 sine, 11msec)
Operating Vibration	0.006in. p-p, 10-70Hz, 1.0g peak, 70-640Hz sine
Non-Operating Vibration	0.015in. p-p, 10-51Hz, 2.0g peak 51-640Hz sine
Electrical	
Line Voltage	90 to 264VAC
Line Frequency	47-70Hz
Ground Leakage	1.0 uA max at 1.5KVDC
Power Consumption	130W max, 190 VA max
Physical	
Panel Bezel Dimensions (W x H x D)	19.0in. x 15.7in. x .7in. (482mm x 399mm x 17mm)
Overall Dimensions (from rear surface of front panel to back)	17.6in. x 14.0in. x 20.1in. (447mm x 356mm x 511mm)
Net Weight	84lb (38.2kg)
Certifications	
	UL 1950 Recognized Component, C-UL 950 Recognized Component, CE97 (89/336/EEC and 73/23/EEC), FCC Class A

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Rockwell Automation Headquarters, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414 382-2000, Fax: (1) 414 382-4444
Rockwell Automation European Headquarters, Avenue Hermann Debroux, 46 1160 Brussels, Belgium, Tel: (32) 2 663 06 00, Fax: (32) 2 663 06 40
Rockwell Automation Asia Pacific Headquarters, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846
World Wide Web: <http://www.ab.com>