

**WFM5200 Series
Waveform Monitors
System Integration
Technical Reference**



077-0548-01

Tektronix

**WFM5200 Series
Waveform Monitors
System Integration
Technical Reference**

Warning

The service instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

www.tektronix.com

077-0548-01

Tektronix

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- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

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General safety summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To avoid fire or personal injury

Use proper power cord. Use only the power cord specified for this product and certified for the country of use.

Ground the product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

Power disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do not operate without covers. Do not operate this product with covers or panels removed.

Do not operate with suspected failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Use proper AC adapter. Use only the AC adapter specified for this product.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

Provide proper ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in this manual These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and terms on the product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



Standby

Preface

This document provides information for system integrators who are designing systems for high definition multimedia interface (HDMI) formats and high-definition (HD), standard-definition (SD), and 3 Gb/s SDI digital video content where the Tektronix WFM5200 and WFM5250 Waveform Monitors will be deployed.

This manual is divided into the following sections:

- *Physical, environmental, and power specifications* (See page 1.)
- *Rack and custom installation* (See page 3.)
- *Instrument connectors* (See page 5.)
- *System installation* (See page 16.)
- *Network operation* (See page 22.)

Where to find more information

The following tables list the documentation that is available for the product and shows where you can find it: in a printed manual, on the product documentation CD-ROM, or on the Tektronix Web site.

Table i: Product documentation

Item	Purpose	Location
Installation and Safety Instructions	Provides safety and compliance information along with hardware installation instructions to present the associated safety warnings. This manual is available in English, Japanese, Russian, and Simplified Chinese.	Printed manual and also available in electronic format at www.tektronix.com/downloads
User Manual	Provides operation and application information.	Product Documentation CD and available at www.tektronix.com/downloads
Online Help	In-depth instrument operation and UI help.	On the instrument
Specifications and Performance Verification Technical Reference	Specifications and procedures for checking instrument performance.	Product Documentation CD and available at www.tektronix.com/downloads
Release Notes	Software release information about new features and existing issues.	Available at www.tektronix.com/downloads
Service Manual	Provides information about adjustments, repair, and replaceable parts.	Available at www.tektronix.com/downloads

Table ii: Related reference documents

Item	Purpose	Location
Top 10 Application-Based Presets	Describes useful presets and how to set them up.	Product Documentation CD and available at www.tektronix.com/downloads
Preventing Illegal Colors (application note)	Describes how the Diamond, Arrowhead, and Lightning displays can be used to help prevent the undesired impact of color gamut violations and to simplify the assessment of proper gamut compliance.	Product Documentation CD and available at www.tektronix.com/downloads
Understanding Colors and Gamut (poster)	Provides a large visual display of how the Diamond, Arrowhead, and Lightning displays can be used to help prevent the undesired impact of color gamut violations.	Available at www.tektronix.com/downloads
A Guide to Standard and High Definition Digital Video Measurements (primer)	This book explains the basics of making standard and high-definition, digital-video measurements.	Product Documentation CD and available at www.tektronix.com/downloads
Analog and Digital Audio Monitoring (application note)	Describes how to monitor analog and digital audio signals. Also discussed are specific differences in the methods used to monitor analog audio versus digital audio, and how to plan the transition from monitoring analog audio to monitoring digital audio.	Available at www.tektronix.com/downloads
Audio Monitoring (application note)	Describes balanced and unbalanced audio signals, and explains the physical and electrical characteristics and the specific strength and weaknesses of the different digital audio signal formats.	Available at www.tektronix.com/downloads
Monitoring Surround Sound Audio (application note)	Describes the basics of 5.1-channel surround sound audio and tells how to use the Surround Sound display to visualize key audio-level and phase relationships in this audio format.	Available at www.tektronix.com/downloads
NTSC Video Measurements (primer)	This book explains the basics of making NTSC video measurements.	Product Documentation CD and available at www.tektronix.com/downloads
PAL Systems Television Measurements (primer)	This book explains the basics of making PAL video measurements.	Product Documentation CD and available at www.tektronix.com/downloads

Table iii: Graphics and photos for system integrators

Item	Purpose	Location
Front and rear panel photos of the WFM5200 and WFM5250	These photos might be useful if you need to present information to your customer	Product Documentation CD
Front and rear panel line art	This line art might be useful if you need to present information to your customer	Product Documentation CD and this manual

Physical, environmental, and power specifications

The physical, environmental, and power specifications apply to all instrument models. Use this information to ensure proper ventilation and clearance when installing an instrument into a rack.

Table 1: Physical specifications

Characteristic		Description
Dimensions	Height	5.25 in (133.4 millimeters)
	Width	8.5 in (215.9 millimeters)
	Depth	4.75 in (120.7 millimeters)
Weight	Net	3.3 lbs (1.5 kilograms)
	Shipping	12 lbs (5.4 kilograms), approximate, excluding options and accessories

Table 2: Power specifications

Characteristic		Description
Power	Input Voltage	100 to 240 VAC \pm 10%
	Input Power Frequency	50 or 60 Hz
	Power Consumption, typical	50 to 110 VA at 110 or 240 VAC

NOTE. More information about the power connector is available in this document. (See page 6, Power connector.) You can also read about the power-on and power-off procedures. (See page 20.)

Table 3: Environmental specifications

Characteristic		Description
Temperature	Operating	0 °C to +40 °C
	Nonoperating	-20 °C to +60 °C
Humidity	Operating	20% to 80% relative humidity at up to +40 °C, noncondensing
	Nonoperating	Below 5% or above 90% relative humidity at up to +60 °C, noncondensing
Altitude	Operating	9,842 feet (3,000 meters)
	Nonoperating	40,000 feet (12,192 meters)

Table 3: Environmental specifications (cont.)

Characteristic	Description
Cooling	The variable fans provide forced air circulation. Do not block ventilation openings.
Base instrument (no optional sleeves)	To allow for proper airflow, there must be at least 2 inches of clearance on both sides of the instrument, at least 2 inches of clearance from the rear of the instrument, and at least a 1/2 inch of clearance from the top of the instrument.
Portable cabinet	Use only the Tektronix portable cabinet, WFMF02, to allow for proper airflow with this instrument. When using the portable cabinet, the same minimum clearances as the base instrument apply.
Rack cabinet	Use only the WFMACK-NN or WFMACK-S2 rackmount rack adapter for this instrument. To allow for proper airflow when installing the rack adapter in a closed rack with solid walls, there must be at least 2 inches of clearance from both sides of the rack adapter frame to the rack side walls, at least 3 inches of clearance from the rear of the rack adapter frame to the back wall of the rack, and at least a 1/2 inch of clearance from the top of the rack adapter to another rack adapter or installed instrument. The rack intake air to the side vents must not exceed 40 °C.

Rack and custom installation

The instrument is shipped in a wrap-around chassis that covers the instrument bottom and two sides. A cover is installed on the chassis, and the rear panel is made up of the module rear panels.

You can operate the instrument in the instrument chassis (be sure the top cover is on) or installed in an approved portable cabinet or rack adapter. (See page 4, *Rack adapter installation.*) You can also install the instrument in a custom installation, such as a console.

CAUTION. To prevent damage to the instrument and the cabinet, do not install the instrument in any cabinet except the WFM RACK-NN, WFM RACK-S2, or other rack approved by Tektronix for this instrument.

WFM RACK adapter dimensions

The following two figures show the dimensions of the WFM RACK-NN and WFM RACK-S2 rack adapter hardware.

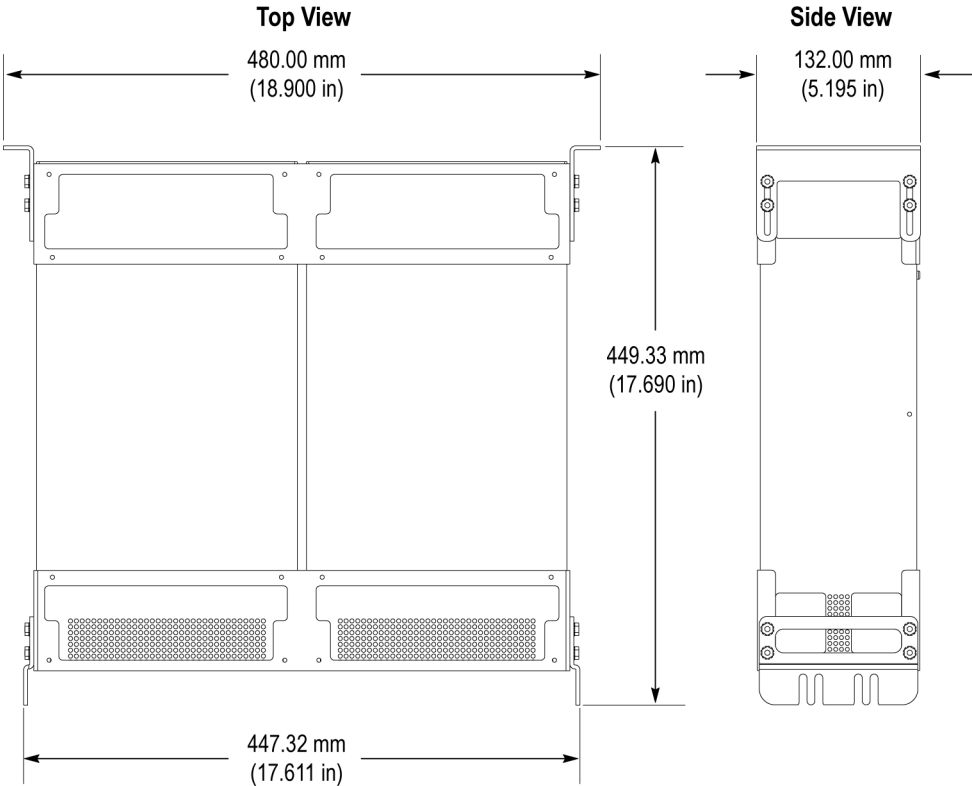


Figure 1: WFM RACK rack adapter dimensions

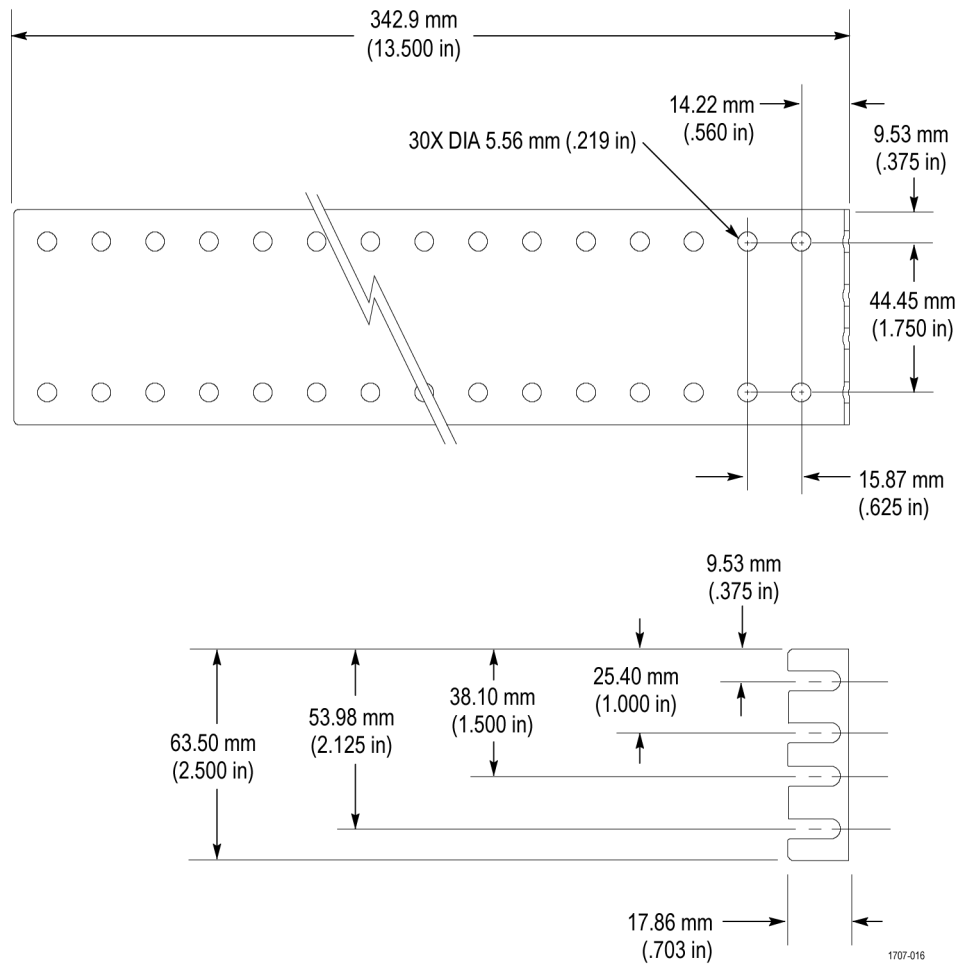


Figure 2: WFM RACK rear-bracket guide dimensions

Custom installation

If you install the instrument in a custom application, such as a console, be sure to provide adequate airflow. Follow these guidelines:

- Do not block the ventilating holes.
- Adhere to the clearance requirements. (See Table 3 on page 1.)

Rack adapter installation

Install the rack adapter into the equipment rack before you install an instrument into the adapter.

To install the instrument in a 19-inch equipment rack, you must use the WFM RACK-NN or WFM RACK-S2 Rack Adapter kit. These rack adapters are designed to house two half-rack instruments side-by-side in a rack. The -NN rack can house one full depth and one short depth instrument. The -S2 rack can house two short depth instruments. For installation instructions, see the instruction manual that is included in the kit.

Instrument connectors

The WFM5200 and WFM5250 instruments have connectors on the front and rear panels. The following pages describe the connector types, pin numbering, and associated signal requirements.

NOTE. More illustrations and photographs of these instruments are available in JPEG format on the Tektronix Web site (www.tektronix.com/downloads) and on the Product Documentation CD that was shipped with your instrument.

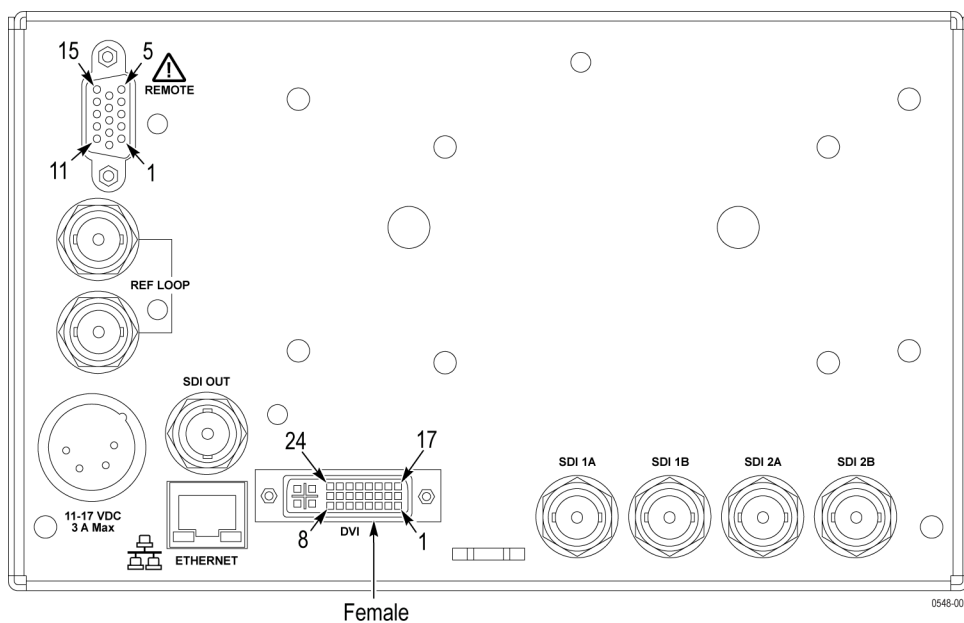


Figure 3: WFM5200 rear panel

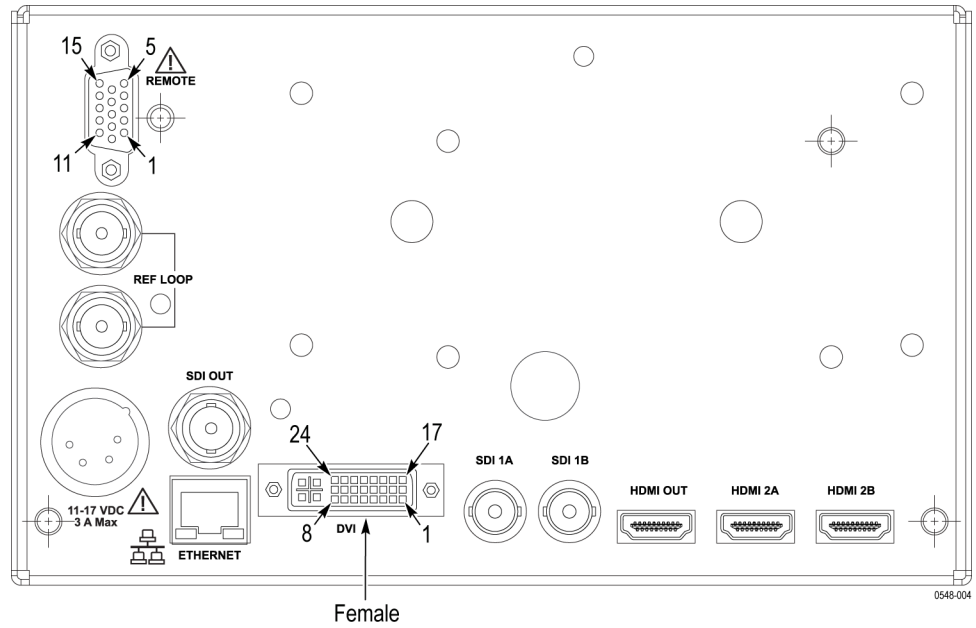


Figure 4: WFM5250 rear panel

Power connector



NOTE. If you ordered a power cord, it will come with a ferrite core. Install the ferrite core as shown in the instructions with which it was shipped.

The instrument operates from an external AC adapter and has the following power requirements:

- A single-phase power source with one current-carrying conductor at or near earth-ground (the neutral conductor).
- The power source frequency must be 50 or 60 Hz, and a operating voltage range must be from 100 to 240 VAC, continuous.



WARNING. *To reduce risk of fire and shock, make sure the mains supply voltage fluctuations do not exceed 10% of the operating voltage range.*

- Systems with both current-carrying conductors live with respect to ground (such as phase-to-phase in multiphase systems) are not recommended as power sources.

NOTE. *Only the line conductor is fused for over-current protection. The fuse is internal and not user replaceable. Do not attempt to replace the fuse. If you suspect the fuse has blown, return the unit to an authorized service center for repair.*

SDI video connectors

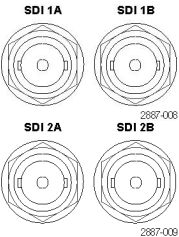

SDI inputs are self-terminating inputs. Use the SDI 1A, 1B, 2A, and 2B inputs to connect a serial digital video signal to the instrument.

NOTE. *The SDI 2A and 2B connectors are only found on the WFM5200 model.*

The SDI OUT can be selected to output either the looped-through input signal or a test signal that contains configurable error brightups. This is done from the Config > Outputs > SDI Output menu.

The following table lists the characteristics of the SDI video connectors.

Table 4: SDI video connector specifications

Connector	Characteristic	Description
	Input Type	BNC, 75 Ω internally terminated WFM5250 only: 2 inputs, only one active at a time except for Dual Link (2 inputs) or SIM mode (Option SIM). WFM5200 only: 4 inputs, only one active at a time except in camera balance mode (2-4 inputs) or Dual Link (2 inputs).
<p>NOTE. <i>The SDI 2A and 2B connectors are only found on the WFM5200 model.</i></p>	Input Level	800 mV ± 10%
	Cable Loss Accommodation: 270 Mb/s	0 to 30 dB attenuation at ½ of serial rate Equivalent to approximately 300 m of Belden 8281 at 270 Mb/s
	Cable Loss Accommodation: 1.5 Gb/s, 3 Gb/s	0 to 20 dB attenuation at ½ of serial rate Equivalent to approximately 80 m of Belden 8281 at 1.485 Gb/s. Typical performance to 110 m
	Output Type	BNC, 75 Ω internally terminated
	Output Level	800 mV ± 10% into 75 Ω load

HDMI video connectors (WFM5250 only)

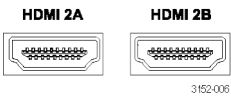
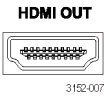
HDMI inputs are self-terminating inputs. Use the HDMI 2A and 2B inputs to route incoming HDMI signals into the rear-panel of the instrument. You cannot monitor a 3D signal and an HDMI signal at the same time. You can only monitor one at a time.

The HDMI OUT can be used to output an HDMI signal to an external HDMI monitor. An HDCP compliant monitor is required in order to view an image for HDCP compliant inputs, otherwise the screen may be blank. Also, the SDI output will not be available when HDCP content is present on the HDMI input.

The following table lists the characteristics of the HDMI connectors.

NOTE. *The HDMI 2A and 2B connectors are only found on the WFM5250 model.*

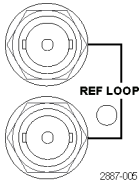
Table 5: HDMI connector specifications

Connector	Characteristic	Description
 <p>HDMI 2A HDMI 2B 3152-006</p>	Input Type	Type A connector 2 inputs, only one active at a time
	Format	Supported formats include: 525i, 625i, 525p, 625p, 720p, 1080i, 1080p
	Audio	Uncompressed audio over HDMI is supported (up to 8 channels)
	HDCP	HDCP version 1.4 is supported on both inputs
 <p>HDMI OUT 3152-007</p>	Output Type	BNC, 75 Ω internally terminated
	Video	Video output is always a loopout of the currently selected HDMI input
	Audio	Audio is passed from the HDMI input to the output
	HDCP	HDCP version 1.4 is supported on both inputs. If HDCP is present on the currently selected input, it will be enabled on the output.

Video external reference connector

Use the REF LOOP connector to input a composite Black Burst signal or a tri-level sync signal for use as a sync timing reference for the selected video input signal. The following table lists the signal characteristics of the external reference connectors.

Table 6: External reference connector specifications

Connector	Characteristic	Description
 <p>REF LOOP 2887-006</p>	Input Type	BNC, passive loop-through, 75 Ω compensated
	Input Level	-6 to +6 dB
	Maximum Input Voltage Level	± 5 V, DC
	Maximum Absolute Input Voltage	± 5 V, DC

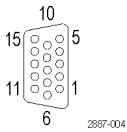
**Remote connector
(WFM5200 only)**

The REMOTE connector is a 15-pin, female, D-type connector with socket contacts. It uses ground closures for remote control and sending indications to external equipment when alarms have occurred. The input of LTC is through the REMOTE connector.

Use the Remote connector to input LTC time code signals, and to remotely select one of the first four instrument presets in group “A” using ground closure. The following table lists the signal characteristics of the Remote connector.

Table 7: WFM5200 remote connector pin assignments and preset functions

Characteristic	Pin out	Preset functions			
		Hex	Binary Pins 15, 14, 13, 12, 11, 10	Direct mode selection	Encoded mode selection
Connector Pin Assignments	1 GND (In)				
	2 Reserved (I/O)				
	3 Reserved (I/O)				
	4 Reserved (In)				
	5 Reserved (In)	F	111111	none	No action
	6 GND (In)	E	XX1110	Preset 1	No action
	7 Time Code Positive (LTC In)	D	XX1101	Preset 2	No action
	8 Time Code Negative (LTC In)	C	XX1100		SDI 1B/2B
	9 Ground Closure (Alarm Out)	B	XX1011	Preset 3	SDI 1A/2A
	10 Preset 1 (In)	A	XX1010		No action
	11 Preset 2 (In)	9	XX1001		No action
	12 Preset 3 (In)	8	XX1000		Preset 8
	13 Preset 4 (In)	7	XX0111	Preset 4	Preset 7
	14 Preset 5 (In)	6	XX0110		Preset 6
	15 Preset 6 (In)	5	XX0101		Preset 5
	4	XX0100		Preset 4	
	3	XX0011		Preset 3	
	2	XX0010		Preset 2	
	1	XX0001		Preset 1	
	0	XX0000		Unused	
	N/A	101111	Preset 5	N/A	
	N/A	011111	Preset 6	N/A	



Characteristic	Description
LTC Input Connector	15-pin DSUB, balanced, unterminated
LTC Input Signal	Longitudinal Time Code per IEC Publication 461
LTC Signal Amplitude Range	0.2 V _{p-p} to 5.0 V _{p-p} balanced differential or single-ended
Ground Closure Input Signal	TTL thresholds, 5 V max input, -0.5 min input; pull low to assert
Ground Closure Output Signal	One open collector output

Remote connector (WFM5250 only)

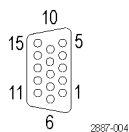
The REMOTE connector is a 15-pin, female, D-type connector with socket contacts. It uses ground closures for remote control and sending indications to external equipment when alarms have occurred. The input of LTC is through the REMOTE connector.

Use the Remote connector to input LTC time code signals, and to remotely select one of the first four instrument presets in group “A” using ground closure. The following table lists the signal characteristics of the Remote connector.

Table 8: WFM5250 remote connector pin assignments and preset functions

Characteristic	Pin out	Preset functions			
		Hex	Binary Pins 15, 14, 13, 12, 11, 10	Direct mode selection	Encoded mode selection
Connector Pin Assignments	1 GND (In)				
	2 Reserved (I/O)				
	3 Reserved (I/O)				
	4 Reserved (In)				
	5 Reserved (In)	F	111111	none	No action
	6 GND (In)	E	XX1110	Preset 1	HDMI B
	7 Time Code Positive (LTC In)	D	XX1101	Preset 2	HDMI A
	8 Time Code Negative (LTC In)	C	XX1100		SDI B
	9 Ground Closure (Alarm Out)	B	XX1011	Preset 3	SDI A
	10 Preset 1 (In)	A	XX1010		Channel B
	11 Preset 2 (In)	9	XX1001		Channel A
	12 Preset 3 (In)	8	XX1000		Preset 8
	13 Preset 4 (In)	7	XX0111	Preset 4	Preset 7
	14 Preset 5 (In)	6	XX0110		Preset 6
	15 Preset 6 (In)	5	XX0101		Preset 5
	4	XX0100		Preset 4	
	3	XX0011		Preset 3	
	2	XX0010		Preset 2	
	1	XX0001		Preset 1	
	0	XX0000		Unused	

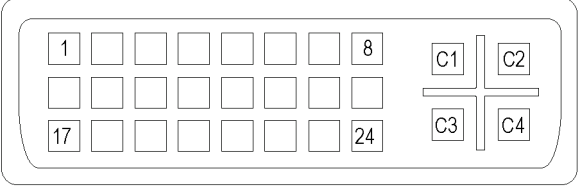
Characteristic	Description
LTC Input Connector	15-pin DSUB, balanced, unterminated
LTC Input Signal	Longitudinal Time Code per IEC Publication 461
LTC Signal Amplitude Range	0.2 V _{p-p} to 5.0 V _{p-p} balanced differential or single-ended
Ground Closure Input Signal	TTL thresholds, 5 V max input, -0.5 min input; pull low to assert
Ground Closure Output Signal	One open collector output



EXT DISPLAY connector

The EXT DISPLAY connector is a female DVI-I connector with socket contacts. This is the external display monitor output. The display resolution is 1024 x 768. The output supports DVI monitors directly and analog PC (RGB) monitors with the use of a DVI-I to VGA adapter.

Table 9: EXT DISPLAY connector specifications

Connector	Pin	Description	Pin	Description
 0091-006				
	1	TMDS Data 2- Red - (Link 1)	13	TMDS Data 3+ Blue + (Link 2)
	2	TMDS Data 2+ Red + (Link 1)	14	Ground
	3	TMDS Data 2/4 shield	15	+ 5 V Power for monitor when in standby
	4	TMDS Data 4- Green - (Link 2)	16	Hot plug detect
	5	TMDS Data 4+ Green + (Link 2)	17	TMDS Data 0- Blue - (Link 1) and digital sync
	6	DDC clock	18	TMDS Data 0+ Blue + (Link 1) and digital sync
	7	DDC data	19	TMDS data 0/5 shield
	8	Analog vertical sync	20	TMDS Data 5- Red - (Link 2)
	9	TMDS Data 1- Green - (Link 1)	21	TMDS Data 5+ Red + (Link 2)
	10	TMDS Data 1+ Green + (Link 1)	22	TDMS clock shield
	11	TMDS Data 1/3 shield	23	TDMS clock + Digital clock + (Links 1 and 2)
	12	TMDS Data 3- Blue - (Link 2)	24	TDMS clock - Digital clock - (Links 1 and 2)
	C1	Analog red	C4	Analog horizontal sync
	C2	Analog green	C5	Analog ground Return for R, G, B signals
	C3	Analog blue		
Characteristic	Description			
Output Connector	DVI-I (integrated, digital and analog)			

Ethernet connector

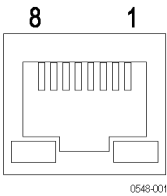
Use the Ethernet connector to connect the waveform monitor to your local network. A network connection is required for remote control, software upgrades, and enabling some instrument options.

The Ethernet connector includes built-in green and yellow LEDs to indicate signal status as indicated below:

- Lit green LED indicates connection is active
- Lit yellow LED indicates a 100 MB transmission rate
- Unlit yellow LED indicates a 10 MB transmission rate

The following table lists the signal characteristics of the Ethernet connector.

Table 10: Ethernet connector pin assignments

Connector	Pin/LED	Name	Description
	1	TX_D1+	Transceive Data+
	2	TX_D1-	Transceive Data-
	3	RX_D2+	Receive Data+
	4		Not used
	5		Not used
	6	RX_D2-	Receive Data-
	7		Not used
	8		Not used
Characteristic	Description		
Ethernet connector	RJ-45 LAN supporting 10/100/1000 BaseT; supports manual and DHCP address modes		

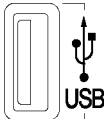
Headphone jack Use the headphone jack, located on the front panel, to listen to the audio associated with the selected video input signal. The following table describes the signal characteristics of the headphone jack.

Table 11: Headphone jack specifications

Connector	Characteristic	Description
	Output Type	Standard 1/4-inch stereo phone jack, capable of driving a 6.25 dBu sine wave into 32 Ω or 16 Ω

USB Connector Use the USB connector, located on the front panel, to save and restore instrument presets and captured data using a USB memory drive. The following table describes the signal characteristics of the USB connector.

Table 12: USB connector specifications

Connector	Characteristic	Description
	Type	Host
	Speed	Complies with USB 1.1 and 2.0 Full Speed Specification (12 Mb/s)

Video system installation

The instrument can operate almost anywhere in the distribution system.

NOTE. See the *Specifications and Performance Verification manual on the Product Documentation CD* for maximum-allowed cable lengths.

Install to monitor the video bit stream of a serial receiver

Route one or more incoming serial signals into the SDI inputs on the rear-panel of the instrument.

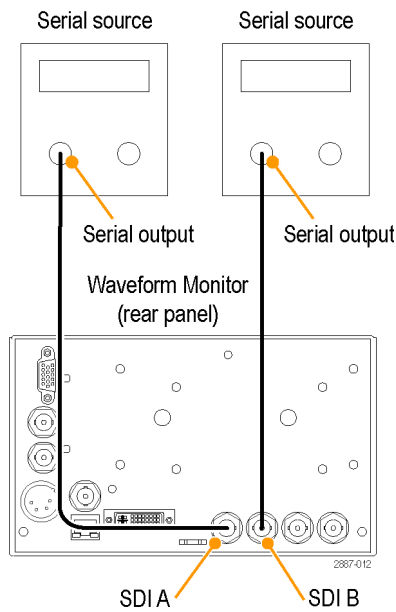


Figure 5: Connecting SD, HD, or 3 Gb/s SDI signals to a WFM5200

NOTE. See the *Specifications and Performance Verification manual on the Product Documentation CD* for maximum-allowed cable lengths.

Install to monitor the embedded audio signal in a serial digital video stream

Route the incoming serial signal into one of the instrument SDI inputs.

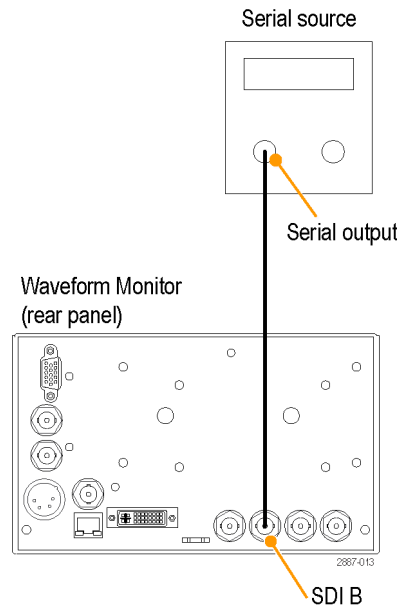
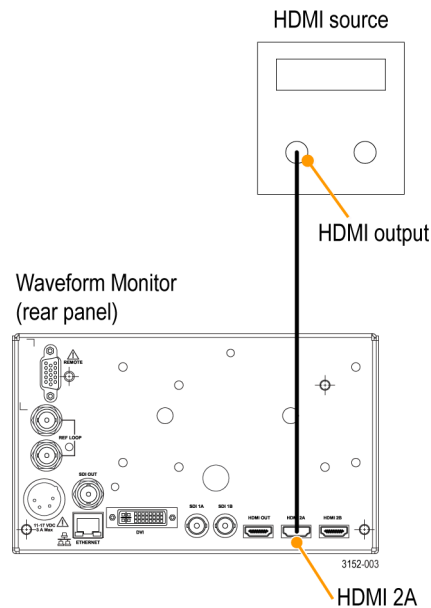


Figure 6: Connecting an SD, HD, or 3 Gb/s SDI signal with embedded audio

Install to monitor the HDMI content of a signal

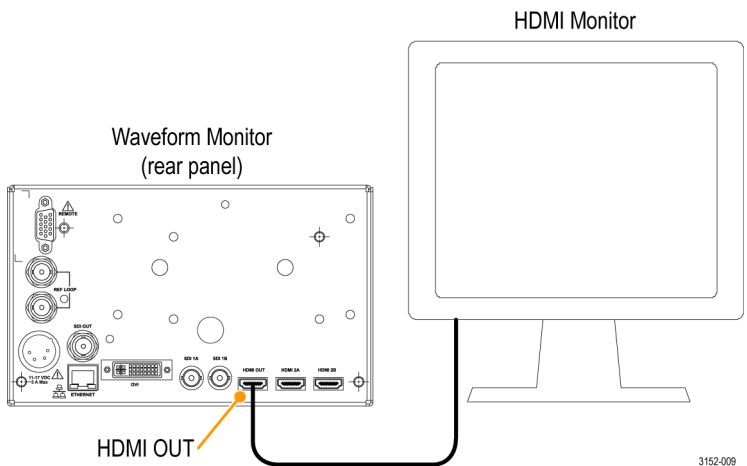
You can route one incoming HDMI signal into one of the HDMI inputs on the rear-panel of the instrument. You cannot monitor a 3D signal and an HDMI signal. You can only monitor one at a time.



Install to output an HDMI signal to an external monitor

You can output an HDMI signal to an external HDMI monitor using the **HDMI OUT** connector.

NOTE. An HDCP compliant monitor is required in order to view an image for HDCP compliant inputs, otherwise the screen may be blank. Also, the SDI output will not be available when HDCP content is present on the HDMI input.



Install to monitor the external reference signal

Route the incoming reference signal into one of the instrument REF inputs and terminate the other connector with a 75 Ω terminator to ensure a closed loop.

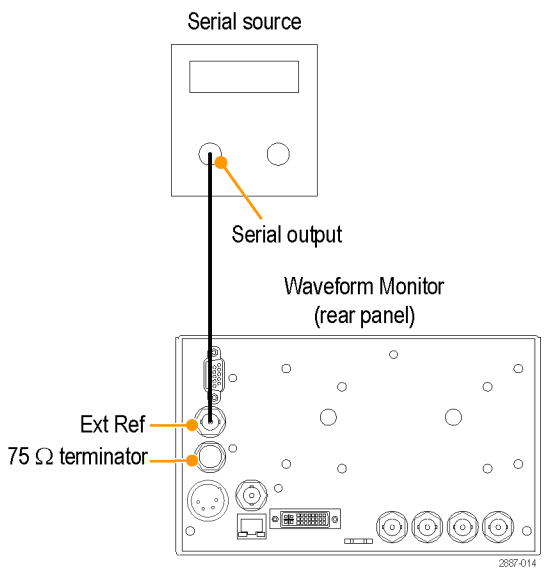


Figure 7: Connecting an external reference signal

Line termination

Your instrument uses a passive loop-through reference input. Accordingly, the loop-through input must be terminated externally. It is important that this external termination meets accuracy and return loss requirements.

If the instrument is installed to monitor an operating link, the destination receiver and the connecting cable serve as the termination. This monitoring connection checks the performance of the entire path. The return loss of the instrument is sufficiently high that, in most cases, the destination receiver sets the system return loss.

In cases where the instrument is placed at the end of a link, a BNC termination must be installed on one side of the loop-through reference connector. The termination must be 75 Ω and DC coupled (good return loss extends to DC). An appropriate termination for the EXT REF connector is Tektronix part number 011-0163-00, which is a 75 Ω , End-of-Line termination.

Compatibility of BNC center pins

Most BNC connectors for video equipment, whether 50 Ω or 75 Ω , use a 50 Ω standard center pin. Some laboratory 75 Ω BNC connectors use a smaller diameter center pin. The BNC connectors on the instrument are designed to work with the 50 Ω standard (large diameter) center pins.

Do not use connectors or terminators with the smaller center pins. They could cause intermittent connections.

Power-on and power-off procedure

This instrument operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation.

AC power requirements

The instrument operates from an external AC adapter with a line frequency of 50 or 60 Hz, over the range of 100-240 Volts, without the need for configuration, except the power cord. The typical power draw is 27 Watts. Refer to the *Specifications and Performance Verification Technical Reference* on the Product Documentation CD for additional information on power and environmental requirements.

If you are using a battery as a power source, read the battery information provided in *Installation and Safety Instructions*.

Power-on

1. Connect the supplied power cord to the rear-panel power connector. If you are using a battery, connect the battery as explained in the installation instructions that come with the battery.
2. Press the power button on the instrument front-panel and the instrument will turn on.

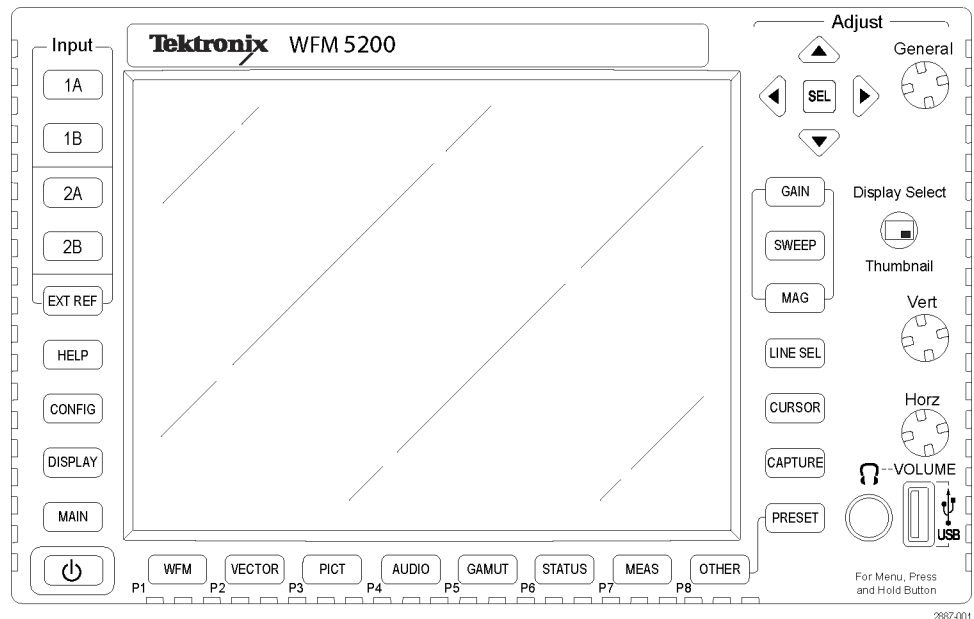


Figure 8: WFM5200 front-panel

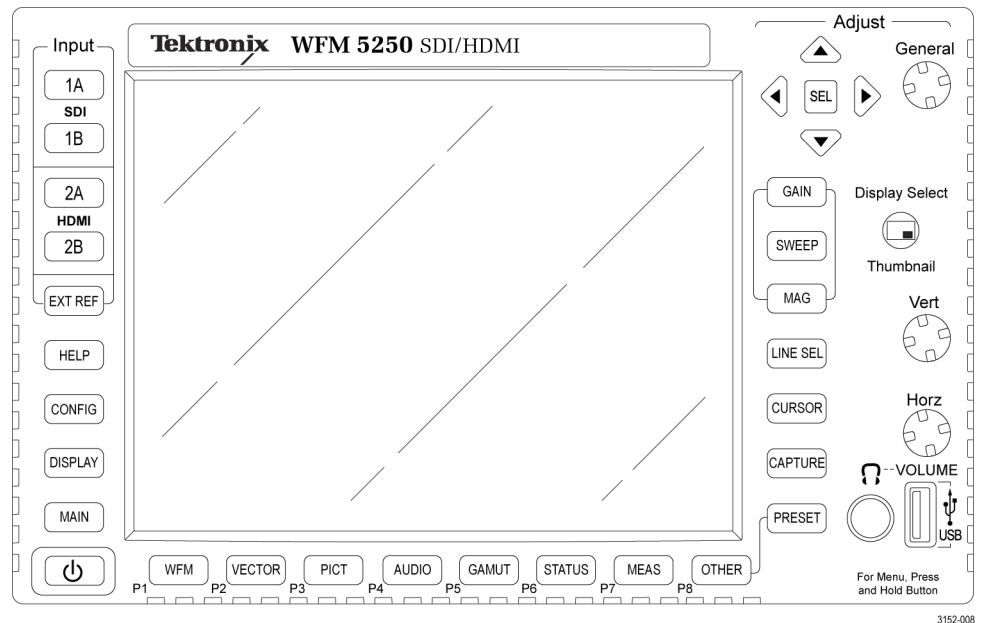


Figure 9: WFM5250 front-panel

NOTE. *The power button on the front-panel does not disconnect mains power. Only the power cord at the rear of the product can disconnect mains power.*

Make sure that the power cord is accessible when the product is operating.

- Power-off**
1. Press the power button on the instrument front-panel to turn the instrument off.
 2. To remove power completely, disconnect the power cord from the rear-panel of the instrument.

Network operation

This section provides the following information for operating the instrument on a local LAN network:

- How to configure the instrument for operation on an IP network
- How to configure the instrument to send and/or receive SNMP remote commands
- How to use a Web browser to start a remote application to enable control of the instrument, or to download the Event and Diagnostic log files, or to capture images of the instrument display

Ethernet connection

Connect the instrument to your network using an Ethernet cable. You can connect it directly to the instrument or through a HUB, as shown below.

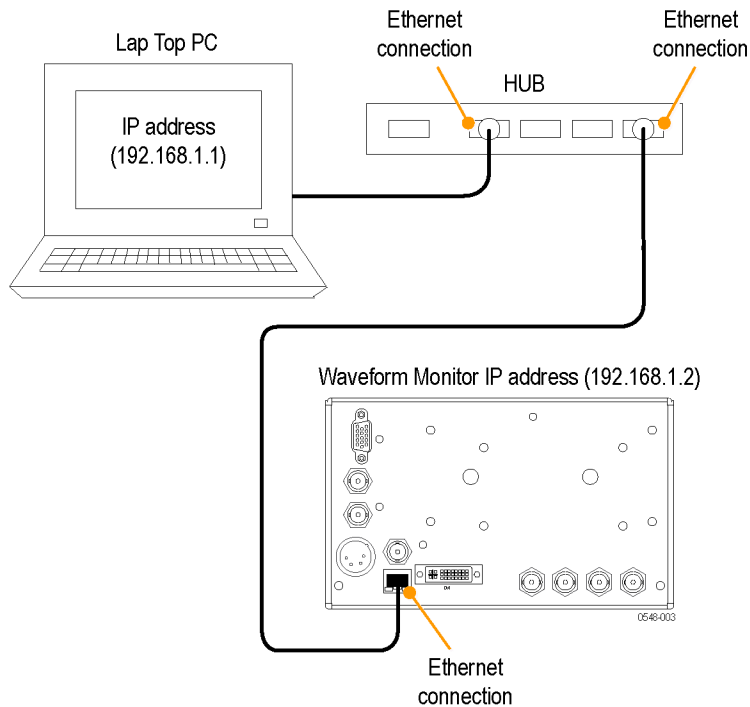


Figure 10: Connecting to ethernet

IP settings configuration

To allow network access to the instrument, you need to set the IP address. Network addresses can be assigned either automatically (DHCP) or manually. If your network does not use DHCP, you will have to manually enter the address for the instrument. To obtain a valid IP address, contact your LAN administrator.

Perform the following steps to configure the IP settings on the instrument:

1. Press the **CONFIG** button to display the Configuration menu.
2. Use the General knob to navigate to **Network Settings**.
3. Press the right arrow key to select **IP Config Mode**.
4. Press the **SEL** button to select between **DHCP** and **Manual**.
5. If you selected DHCP, you are finished.
6. If you selected Manual mode, you need to set the Subnet Mask and Gateway Address parameters. Contact your LAN administrator for these values. (Be sure to use compatible addresses between the PC and the instrument.)
7. Press the down arrow key to select **IP Address**.
8. Press the right arrow key. A dialog box will appear that allows you to enter the IP address.
9. Repeat steps 7 and 8 for the Subnet Mask and the Gateway Address.
10. If desired, select **Instrument Name** and then press the right arrow button to assign the instrument a network name.
11. Press the **CONFIG** button to close the configuration menu.

SNMP remote control configuration

SNMP remote control is primarily intended for instrument access using automated systems. If you intend to use SNMP commands to control the instrument, you must first configure the SNMP settings on the waveform monitor.

NOTE. *The SNMP commands are contained in a MIB (Management Information Base). Refer to the WFM Series Waveform Monitors and WVR Series Waveform Rasterizers Management Information Base Technical Reference (Tektronix part number 077-0261-XX) for information about using the MIB to control the waveform monitor.*

The procedure to configure SNMP settings is similar to that previously described for configuring the IP settings. Touch SNMP Setup in the Communication submenu of the Main menu to configure the following SNMP parameters:

- Remote SNMP Enable. Use this setting to configure the remote access to the instrument via SNMP. You can select Off or On.
- SNMP Traps. Use this setting to enable or disable the SNMP traps that are sent from the instrument when error conditions are detected.
- Trap Destination Address. Use these settings to enter up to four different IP addresses to which SNMP traps will be sent when error conditions are detected.

NOTE. *A value of all zeroes for the IP address will disable that trap output.*

- Private Community String. Use this menu setting to enter the Private Community string, which effectively is a password. Without this string, SNMP commands cannot change values in the waveform monitor.

NOTE. *Use the Private Community String to control the ability of SNMP commands to make changes to the waveform monitor. Use the Public Community String to control the ability of SNMP commands to read information from the waveform monitor.*

- Public Community String. This menu entry allows you to set the Public Community string. This string is effectively a password. Without this string, SNMP commands cannot read information from the instrument.

Web browser operation

You can connect to an instrument installed on an Ethernet IP network without installing any software and using only a Web browser. Using the Web browser, you can perform the following functions:

- Start a remote application to enable control of the instrument
- Download the Event and Diagnostic log files
- Capture images of the instrument display

Perform the following steps to connect to the instrument using a Web browser:

1. Verify that the instrument has been configured for IP network operation and note the IP address. (See page 23, *IP settings configuration*.)
2. Press the **CONFIG** button.
3. Use the General knob to navigate to **Network Settings**.
4. Press the right arrow key and then use the General knob to navigate to **Web Enable**.
5. Press the **SEL** button to select **On**.
6. On your PC, start your Web browser and enter the network address of the instrument into the URL entry box like this:

`http://123.123.123.123/`

NOTE. Many Web browsers do not correctly interpret IP addresses with leading zeros. If the IP address shown in the Configuration menu contains leading zeros, remove any leading zeros when you enter the address in the browser.

For example, the IP address 124.161.038.092 should be entered as follows:

124.161.38.92

7. The Web browser will display the remote interface for the instrument. To make a selection, click the desired link.