

Multi-Standard, Multi-Format Waveform Monitors

WFM6120 • WFM7020 • WFM7120



FEATURES & BENEFITS

Simultaneous A/B Input Support Extends Monitoring Functions (SIM Option)
Full Dual Link Support for High-End Production, Post Production and Manufacturing Applications (DL Option)
Numerical and Graphical Display of A/V Delay (AVD Option)
The WFM7020 and WFM7120 Support HD, SD, and Composite Video Formats
The WFM6120 Supports SD and Composite Video Formats
FlexVu™ XGA Display Increases Productivity with the Ability to Create Hundreds of Custom Multiple-view Displays Tailored to Specific Work Practices
CaptureVu® Video Frame Capture Improves Efficiency in Troubleshooting and Equipment Setup (WFM6120 & WFM7120)
Exclusive Tektronix Gamut Displays Help Ensure Compliant Content
Tektronix's Patented Timing Display Simplifies Plant Timing.
The Patented Tektronix Lightning Display is Ideal for Maintaining Correct Inter-channel Timing.
Extensive Fault Monitoring, Status Reporting, and Error Logging Simplify Content Quality Control
Available High-Performance SDI Physical Layer Measurements (PHY Option) is Available for Eye and Jitter Displays.
In-Depth Digital Data Analysis Helps Quickly Resolve Difficult Quality and Reliability Issues. (DAT Option)
Exceptional Audio Monitoring Available, (Option AD) including support for Dolby® Audio Formats (Option DDE) and a Front-panel Headphone Connector, Reduces Time and Effort in Verifying Multi-channel Audio Content
Standard and User-definable Safe Area Graticules Help Avoid Errors and Rework in Editing and Format Conversion
Front-panel USB Port For Easy Storage and Transfer of Instrument Settings and Video Data
Network Access and Control Supports Remote-site Monitoring
Fully Digital Processing for Accurate, Repeatable, Drift-free Operation
Audio Control Packet provides a decoded display of the embedded audio information.
Thumbnails are Part of WFM when no PIX Tile is Displayed when in Full or FlexVU Four Tile Mode.
New scales Allow Maximum Graticule Display in either Voltage or Percentage on the Left and Hex Values on the Right.
System Upgrades can be done over the Network or via USB

APPLICATIONS

Monitoring and Compliance Checking in Video Distribution and Broadcasting
Quality Control in the Video Production and Post-production
Equipment Qualification and Troubleshooting in the Installation and Maintenance of Video Facilities and Systems

WFM6120

The SD-capable WFM6120 offers high performance monitoring and measurement capabilities. It can be configured to monitor either NTSC/PAL analog video (Opt. CPS), SD Digital Video (Standard), or both video formats. Available audio options offer support for monitoring digital audio (embedded and AES/EBU inputs), analog audio, and Dolby audio formats. Available measurement options offer in-depth digital data analysis and SDI signal measurements, such as Eye diagrams and jitter as well as in-depth video data and ancillary data analysis (Opt. DAT). AV Delay Measurement capability (Opt. AVD) can also be added to the WFM6120.

WFM7020

The HD-capable WFM7020 offers basic monitoring capabilities for applications involving HD digital video. It can be configured to monitor NTSC/PAL analog video (Opt. CPS), SD Digital Video (Standard), HD digital video (Opt. HD) or any combination of these video formats. Available audio options offer support for monitoring digital audio (embedded or AES/EBU inputs) and analog audio. Dual Link (Opt. DL) is also available on the WFM7020.

WFM7120

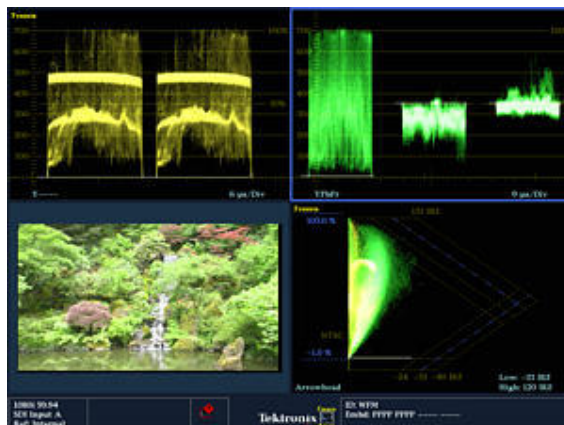
The HD-capable WFM7120 offers high performance monitoring and measurement for applications involving HD digital video. It combines the video and audio monitoring capabilities available on the WFM7020 with available support for Dolby audio (Opt. DDE), in-depth data analysis (Opt. DAT), and SDI signal measurement as well as AV Delay Measurement (Opt. AVD). The WFM7120 also supports Simultaneous A/B Input Monitoring (Opt. SIM) as well as DUAL Link Monitoring (Opt. DL).

Flexible Configurations and Upgrades – Helping You Manage the Digital Transition

To help address the challenges of maintaining both legacy analog and emerging digital video technology during the digital transition, the WFM6120 and the WFM7120\7020 offer an exceptionally broad range of options and upgrades. Video monitoring, audio monitoring, and measurement options can be added to a previously purchased instrument with field installable upgrades. For example, you can purchase a WFM6120 configuration that only monitors SD digital video and add physical layer measurement capability later. If you anticipate a future transition to HD digital technology, you can purchase WFM7020 or WFM7120 configurations without HD support, and then add this capability when your needs change.

CaptureVu™ - Much More than “Freezing” a Display

The CaptureVu capability on the WFM7120 and WFM6120 can capture and store the video data from an entire video frame and display this data on waveform, vector, gamut, and picture displays. Unlike “freeze” captures, you can compare the live signal to capture data in one kind of display (for example, a waveform display), and then reconstitute the same data to make the same live-to-capture comparison in a different display (such as a vector or picture display).



CaptureVu can compare captured data and live signal on multiple displays.

In addition to user-initiated captures, the instrument can do a triggered capture that automatically acquires data on the occurrence of specific faults. Triggered captures are particularly useful for finding intermittent errors and in capturing data about fault conditions at remote sites. CaptureVu then let's you use a variety of displays and settings to investigate the problem.

With CaptureVu, you can store a video frame generated by one piece of equipment (for example, a camera) and use this as a reference to configure other equipment to have matching video characteristics. The data can also be stored on a USB memory device and transferred to another instrument or saved to a PC and provide further detailed analysis using the CaptureVu Utility available from the Tektronix website.

FlexVu™ Display Interface – Four Instruments in One

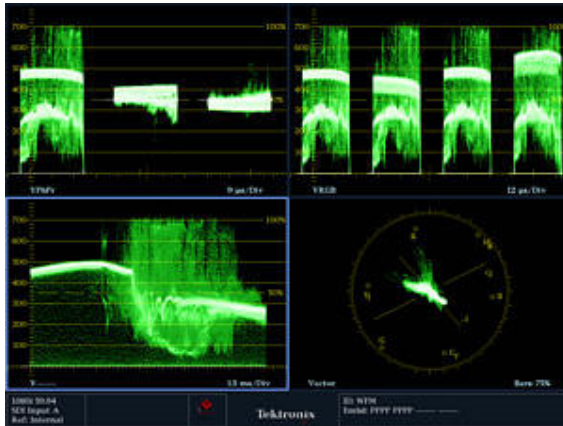
The WFM6120 and the WFM7120\7020 models have an integrated, XGA-resolution display with the Tektronix FlexVu user interface. With FlexVu, you can combine separate monitoring and measurement displays four at a time, in almost any combination. Unlike instruments with pre-determined view combinations or more restricted choices, FlexVu lets you create a multi-view display best suited to your specific needs and work practices.



Use FlexVu to create the multi-view display that best fits your needs.

Waveform Displays – Quickly Verify and Adjust Critical Signal Parameters

Familiar video waveform displays can show digital video signals in RGB, YPbPr, YRGB, or composite formats with flat or low-pass filtering. Waveform displays of composite analog video signals can show NTSC and PAL signals with luma, chroma, and luma+chroma filtering. Signal components can be displayed in either parade or overlay mode, and in composite format displays with setup selection. The waveform display has several sweep rates and easy control of vertical gain and horizontal magnification to help you efficiently monitor and measure video waveform parameters. With FlexVu you can see four differently configured waveform displays of the same signal. With the Simultaneous Input Option different signal sources can be compared side by side.



Waveform and Vector displays.

Vector, Lightning, and SCH Phase Displays – Accurately Control Color Parameters

The vector display offers user-selectable graticules, color targets (75% and 100%), and color axis. The patented Tektronix Lightning display shows luma and chroma amplitudes and lets you verify component inter-channel timing using a color bar signal. The SCH Phase display helps quickly verify this critical timing parameter of composite analog video signals.

Tektronix-exclusive Gamut Displays – Efficiently Detect and Correct Gamut Problems

The patented Tektronix Diamond, Split Diamond and Arrowhead gamut displays simplify the process of verifying gamut compliance. The Split Diamond display helps easily identify and correct RGB gamut errors in digital video signals. The Arrowhead display saves time in verifying the gamut compliance of the composite video signal generated from a digital video signal. With FlexVu, you can simultaneously monitor both gamut displays to quickly gain complete confidence in content compliance throughout the delivery chain. Also, user-selectable gamut thresholds let you tailor these displays, and the associated gamut alarms, to your particular compliance standards.



Quickly detect Gamut errors using specialized displays.

The pseudo composite signal while simply derived from the Serial Digital signal can help speed things up during production processes such as camera set up and has the added advantage of being familiar to most people.

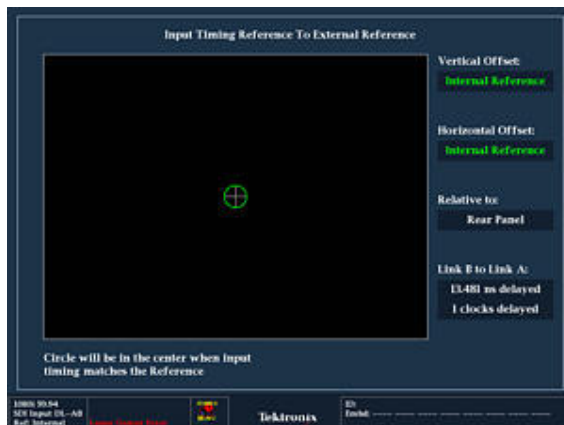
Timing Display - Simplify Plant Timing

The patented Tektronix Timing display makes facility timing easy through a simple graphical representation which shows the relative timing of the input signal (the circle) versus the reference signal (the crosshair).

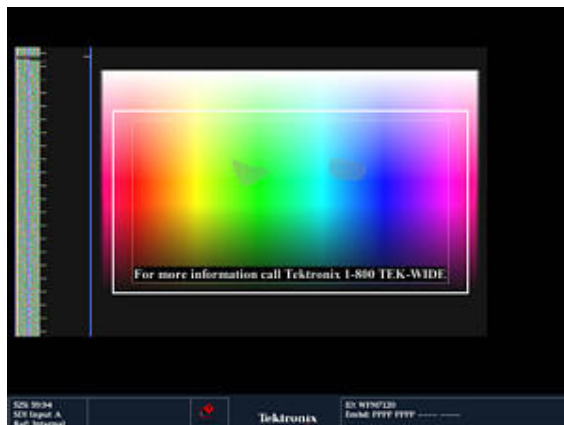
For proper timing, the circle is centered on the crosshair and changes color from red to green. The display also has numeric readouts of the timing difference relative to the reference signal, showing vertical timing as number of lines and horizontal time difference in μsec . With the SIM option Analog to Digital Timing of the input signals or Digital to Digital timing is also possible.



SIM Module allows Digital-To-Digital and Analog-To-Digital Timing



Timing Display Showing A & B Link Timing with DL Opt.



Picture display with Closed Caption, Safe area graticules and gamut brightups

Picture Displays – Quick Visual Conformation and Precision Content Adjustment

A full-color picture display shows the video content of the monitored input. The instrument can display the picture on the full-screen, or on up to four views in a multiple-view display. For different input formats, the picture display automatically adjusts to show the full image content.

The picture display can also show content advisory codes and decoded closed caption data (EIA608 formats) for easy verification of this critical ancillary data.

Editors can choose from several Safe Area graticules on the picture display to quickly verify correct placement of graphics, titles, or logos. Graticule choices include the Safe Action and Safe Title graticules defined in the SMPTE, ITU, and ARIB standards, plus custom, user-definable graticules. Using FlexVu, editors can see two or more pictures with different graticules to verify correct placement for different formats and standards.

You can also select **brightup** conditions that show the location of RGB or composite gamut errors on the picture display. Line and sample brightups show the location of the currently selected line or video data sample. The Blanking mode provides a quick check as to whether ANC Data is present.

Alarms, Quality Statistics, and Logging – Thorough and Fast Content Verification

All models offer a variety of displays for **status at a glance** signal monitoring and quick, thorough content verification.

Using the alarm status display, operators and technicians can quickly detect video faults including gamut, EDH, and CRC errors, SDI format problems, and many more. The instrument offers several alarm notification methods, including on-screen error icons, audible beep, ground-closure output, and SNMP traps.



Alarms, status, quality logistics, and logging.

For verifying and documenting content compliance, the Video Session display shows key status information on the signal plus quality statistics like errored seconds and percentage content with errors.

To support unattended monitoring, and to supply documentation for maintenance records or service level agreements, the instrument logs alarms and other key events (such as format changes). Log entries can be time-stamped with date, time-of-day, and time code reference (VITC, ATC or LTC).

All models also offer extensive ancillary data monitoring. This includes monitoring the presence of closed caption content formats defined by EIA608, EIA708, and ARIB standards.

With the Simultaneous Input Option Error Logging from the dual inputs is combined in a single error alarm display with the source of the error indicated in the status bar.

Audio Monitoring – Versatile Tools Help Confirm and Adjust Sound Quality

The WFM6120 and the WFM7120\7020 offer several options for monitoring both analog and digital audio.

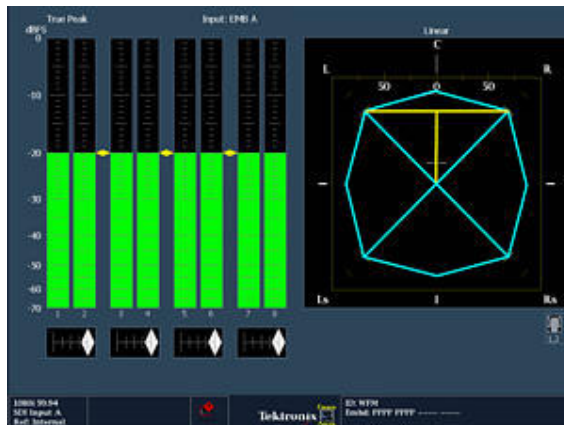
Option Availability	Option
Available on all	Option AD monitors AES/EBU and analog audio formats.

Models	
WFM6120 and WFM7120	Option DDE monitors Dolby Digital (AC-3) plus support for monitoring and decodes Dolby E as well as all the audio formats included in Option AD

Both audio options support the display of Dolby presence.

Option DDE allows decode of the Dolby audio formats and place a status message in the appropriate audio bar, eliminating confusion about audio input formats. Dolby status displays offer in-depth review of decoded Dolby metadata.

Both audio options have an audio bar display that can display up to six audio bars for analog inputs, up to eight audio bars on AES/EBU inputs and embedded audio sources. Up to ten audio bars are displayed when decoding Dolby Digital and Dolby E formats.(DDE Option only).



Audio bars and **Surround Sound *** Displays

The audio options provide user-selectable scales, meter ballistics and audio level indicators. **In-bar** messages show status and fault conditions for each monitored audio channel, reducing the likelihood of an undetected audio problem.

Audio phase displays include phase correlation meters, a flexible Lissajous display (for any pair of channels), and a multiple-channel **Surround Sound *** display that shows audio levels (A-weighted or linear), total sound volume, phantom source locations, and the dominant sound position.

The Audio Session display shows audio error conditions (such as parity errors), Loudness (Leq) as well as highest true peak, and the number of detected, clips, mutes, over-levels and silences. User-specified threshold values determine over-level and silence conditions and the duration a potential audio problem must persist before the instrument generates an alarm.

In addition to monitoring audio inputs, these options can generate analog or digital audio outputs from the analog or AES/EBU audio inputs. They can also generate audio outputs from embedded audio in the video input, or by decoding Dolby audio inputs, including stereo down-mixes. A convenient front-panel headphone connector lets you listen to any stereo audio output.

The audio options can be used to de-embed audio from the SDI signal and output as digital or analog audio depending on the option installed within the instrument. Additionally the audio option can be configured to output digital or analog audio from the selectable inputs or from the decoded Dolby data stream.

With the available Dual Link (Opt. DL) a total of 8 Audio Channels can be monitored from the total of up to 32 embedded audio channels. In the Simultaneous (SIM) option two audio tiles can be displayed with a flexible configuration of 8-0, 6-2, 4-4, 2-6 and 0-8, a total of 8 audio channels can be displayed in this option.

Simultaneous A/B Inputs

Simultaneous input capability adds a new level of power to working in the multi-format environment. This option allows two input signals to be monitored simultaneously allowing operation staff to quickly determine if a video quality problem existed in the input signal, or arose within their facility. Engineering staff can quickly detect, isolate, diagnose, and resolve technical problems introduced by a piece of video equipment or a video equipment chain by quickly comparing the input and output signals. This is especially helpful when checking for transparency during format conversion.



Simultaneous Inputs

- Flexible configuration of displays from two monitored inputs, including waveform/picture and waveform/audio.
- Simultaneous fault detection, status reporting, alarm generation and error logging.
- The Patented Tektronix Timing Display can be used for facility timing allowing each source to be measured, either to an external reference or to the other input signal
- Audio and Video Sessions are independent for each channel
- The SIM option also allows Digital-to-Digital or Analog - to-Digital Timing.
- By using the Saved Offset you can save the timing from one signal and then show the relative timing between the current signal and the saved offset.

CPS	SD/HD
SD	SD
SD	HD
HD	HD

Dual Link

The WFM7120 **Dual Link** option allows high end production facilities, post houses, and equipment manufacturers to seamlessly use all the basic monitoring functionality they are already comfortable with in SD/HD-SDI when working with Dual Link signals, thus allowing users to seamlessly transition from HD/SD -SDI to Dual Link.

insure complete system integrity. The combined graphic and numeric readout accommodates a variety of needs for ease of use, speed and precision.



AV Delay Measurement

The AV Delay Measurement uses the unique video and audio sequence available in the TG700 HDVG7/DVG7 Modules with A/V Timing Mode enabled. The graphical display provides a distinctive zero reference indicator and the A/V measurement indicator visually aligns with this reference indicator when the system under test has neither advanced nor delayed the test signal's audio component relative to its correct temporal position. The instrument can measure up to ± 150 video fields of variation from the audio signal's correct temporal location in the test signal. AV Delay results are displayed in units of milliseconds and fields. The A/V delay measurement has a resolution of 1 video field. A/V delay accuracy is ± 1 video field.

SDI Signal Measurement and Data Analysis – Resolve the Most Challenging Problems



3-Eye, 20-Eye, and Jitter waveform

The WFM6120 and WFM7120 offer options for monitoring and measuring SDI signal parameters:

For basic SDI signal monitoring, Option EYE has Eye pattern displays, plus readouts of jitter and cable length measurement parameters

For more complete SDI signal measurement, Option PHY has all the capabilities of the EYE option plus a jitter waveform display and automated Eye parameter measurements

On the WFM6120, Options EYE and PHY measure SD-SDI signal parameters.

On the WFM7120, these options measure both SD-SDI and HD-SDI signal parameters.

Both the EYE and PHY options can display Eye Patterns in 3-Eye, 10-Eye (SD-SDI), or 20-Eye (HD-SDI) mode. These displays include cursors to manually measure Eye parameters and user-selectable clock bandwidths to help isolate jitter components. Option PHY automatically measures Eye amplitude, rise-time and fall-time.

Both options use a phase demodulation technique with selectable filters to continuously monitor and measure the peak-to-peak (p-p) amplitudes of timing and alignment jitter related to video field rates.

An easy-to-interpret jitter gauge augments the numeric jitter readouts. The jitter waveform display available with Option PHY lets engineers examine signal jitter in greater detail related to the video line and field rates with selectable filter bandwidths (10Hz-100kHz) for Timing and Alignment jitter.

An SDI signal status display summarizes key signal parameters. This includes signal strength, cable loss and cable length based on the user-selected cable type. With FlexVu, you can simultaneously display timing and alignment jitter values, cable parameter measurements and different Eye Patterns to help quickly diagnose and resolve problems related to SDI jitter or cable attenuation.

To help efficiently detect and diagnose errors in digital video data, the WFM6120 and WFM7120 offer Option DAT, containing a color-coded data word display, logic waveforms of the video data, and a display of data words in user-specified ancillary data packets.

Signal Inputs and Outputs, Peripherals, Communication – Convenient Interfaces for Video Systems

The digital video options (SD Standard) and (HD Opt.) have two SDI inputs and a switched output of the selected input signal. The analog video option (Opt. CPS) has two composite analog video inputs with passive loop-through outputs.

The instrument senses the input format and automatically configures the required settings. It will signal a format mismatch if the applied external reference format is not compatible with the input signal.



USB ports and Headphone connector

The audio option (Opt. AD) supports up to 12 analog audio inputs and up to 8 analog audio outputs. The DDE Option supports up to 16 AES/EBU input channels and up to 8 AES/EBU output channels.. All audio options can output to the front-panel headphone port.

The front-panel USB port makes it easy to store captured data or instrument settings on a USB memory stick and transfer this information to another instrument.

All models have a 10/100Base-T Ethernet connection and offer remote access and control with a standard Web-browser. You can use this interface to download presets and error logs, or print the screen contents for easy record keeping.

For simple remote control, a ground-closure type remote interface can indicate an alarm condition or execute instrument presets. An SNMP interface allows easy integration with network management software.