

# ThermoVision™ LabView Digital Toolkit Ver. 3.1

FLIR Systems ThermoVision Digital Toolkit is a set of VIs and examples that gives LabView® programmers an excellent tool to control, access and manipulate image data from FLIR Systems infrared cameras. The Toolkit will accelerate any application programming with FLIR Systems infrared cameras. So if you are an end-user or a system integrator that wants to build its own system utilizing infrared cameras for an R&D, Automation or Security application then the ThermoVision LabView Digital Toolkit together with FLIR Systems infrared cameras will give you a jump start in your task. The ThermoVision LabView Digital Toolkit will allow you to fully exploit the possibilities that modern Infrared Camera technology offers.

## TRUE TEMPERATURE ANALYSIS

The Digital Toolkit is a set of 29 examples and 66 VIs (virtual instruments), of which 36 are general, and 30 related to cameras supporting alarms, measurement function and I/O functionality. As you develop in LabView®, you can use these VIs as sub-VIs to manage the communications with a FLIR Systems IR camera in digital mode. You can also generate true temperature images from images acquired through LabView. This means you can use the LabView® IR Measurement and Display tools to analyze the temperatures of the imaged objects.

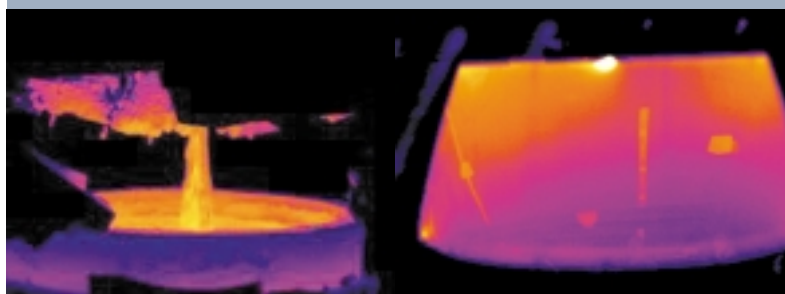
The Digital Toolkit provides the functions needed to:

- Set up communications between LabView VI and the FLIR Systems IR camera
- Capture and gather images via FireWire, Ethernet, IRFlashLink, ITEX and PC-Card interfaces
- Adjust the camera configuration parameters and focus as you view a live image
- Control the camera calibration
- Send any other camera command to the camera
- Generate a true temperature image from a 16-bit image acquired from FireWire or frame grabber interfaces
- Close the communications to the IR camera



## KEY FEATURES

- Supports communication and broadcasting via FireWire and Ethernet interfaces (A- and S-series Cameras)
- Gives the user full control of the camera
- Allows the user to set alarm conditions (A-series only) and measurement functions in the camera
- Allows the user to define I/O functionality (ThermoVision A series)
- Based on ActiveX technology
- Converts 16-bit raw pixels into temperature pixels and several intermediate types of pixels formats, for maximum user flexibility. Applies to all camera models with temperature measurement capabilities
- Allows 16-bit temperature linear outputs from ThermoVision A20 M / A40 M FireWire cameras
- Reads from and writes to file in FLIR Systems' proprietary file format (.img, .seq, .jpg) and writes to files in FLIR Systems' open floating point format (\*.fpf)
- Support for reading radiometric JPEG images produced by the camera
- Emissivity back calculations on a given image coordinate
- Emissivity correction map for absolute temperature images (all camera types)
- Support for sequence files
- Built in support for snapshot read-out of radiometric images (JPEG) produced by the camera
- Down sampling of A20 images to 160 x 120 to save disk space
- Includes method that allows using individual emissivity value correction on any single pixel or condensed measuring value e.g. average, minimum
- Supports acquisition of images through NI National Instruments' Digital Frame grabbers,
- Supports acquisition of images through Imaging Technology's IC-PCI DIG 2, FLIR Systems proprietary PC-Card frame-grabber, Automation Technology's IRFlashLink, or FireWire and Ethernet interfaces
- Supports conditional recording to file through Imaging Technology's IC-PCI DIG 2, FLIR Systems' proprietary PC-Card frame-grabber, Automation Technology's IRFlash-Link, or FireWire or Ethernet interfaces



## OVERVIEW OF THE DIGITAL TOOLKIT VLS

### General VIs

Open		Opens and establishes a connection to the FLIR Systems IR camera
Close		Disconnects communication with the camera
GetVersion		Returns the Camera Control and ThermoVision™ program versions
GetError		Converts a ThermoVision™ error code to a formatted error string
GetCamCmd-ReplyEvent		The CamCmdReply event occurs when the camera control receives a response from a user command issued from the Send CameraCommand-VI NOTE: Not applicable for A & S series cameras
GetCameraEvent		Returns the camera events
SendCamera-Command		Submits a user command to the camera NOTE: Not applicable for A & S series cameras
GetActiveX-Reference		Returns the CamCtrl.ocx reference (ActiveX)
SetFocus		Controls the focus state
GetFocus		Returns the focus absolute position (depends on camera type)
CameraAction		Performs a camera action
GetCamera-Parameters		Returns camera parameters
SetCamera-Parameters		Configures the camera parameters
GetDisplay-Parameters		Reads the display parameters
SetDisplay-Parameters		Configures the display parameters
GetObject-Parameters		Returns the display parameters
SetObject-Parameters		Configures the display parameters
GetCalibration-Parameters		Returns the calibration parameters
SetCalibration-Parameters		Configures the calibration parameters
SetResource-Values		Sets resource values on some cameras NOTE: Only applicable for A & S series cameras

GetResource-Value		Gets resource values on some cameras NOTE: Only applicable for A & S series cameras
LoadIRFile		Loads an IR image file from file path to the camera control
GetSequenceFile Parameters		Gets sequence file parameters
SetSequenceFileParameters		Sets sequence file parameters
Digital GetLUT		The table translates raw digital image pixels to temperature See also section '1.5 Pixel definitions'
Digital GetAbsLUT		The table translates raw digital image pixels to absolute pixels See also section '1.5 Pixel definitions'
Digital GetObjLUT		The table translates raw digital image pixels to object pixels See also section '1.5 Pixel definitions'
Digital To-Temperature		Converts a given raw pixel value to temperature in Kelvin See also section '1.5 Pixel definitions'
Digital SetImage		Sets an image with raw image pixel values
Digital GetImage		Returns an 2D array with pixel values from the camera
Digital SetImage-Mode		Configures the camera to send different types of images (A series cameras only)
Digital Recording-Action		Performs a recording action
Digital Get-Recording-Parameters		Returns the recording parameters
Digital Set-Recording-Parameters		Configures the recording parameters
Digital SetImage-Size		Pre-allocates image buffers. Used when multiple images should be acquired with Digital GetImages-VI
Digital GetImage-Size		Starts, acquires, and releases a sequence acquisition Use this VI to capture single or multiple images in a high speed

### VLS ONLY INTENDED FOR CAMERAS SUPPORTING INTERNAL MEASUREMENT FUNCTIONS \*

CameraMeas-Func Create	CameraMeas-Func Destroy	CameraMeas-Func Difference	CameraMeas-Func Enable	CameraMeas-Func Isotherm	CameraMeas-Func Measurement	CameraMeas-Func ObjectParameters	CameraMeas-Func Position

### VLS ONLY INTENDED FOR CAMERAS SUPPORTING INTERNAL ALARMS \*\*

CameraAlarm Create	CameraAlarm Destroy	CameraAlarm GetAction	CameraAlarm SetAction	CameraAlarm GetCondition	CameraAlarm SetCondition	CameraAlarm SetEnable	CameraAlarm GetStatus

### VLS ONLY INTENDED FOR CAMERAS WITH I/O FUNCTIONS \*\*

CameraPorts Create	CameraPorts Destroy	CameraPorts AnalogInput Config	CameraPorts AnalogInput ReadValue	CameraPorts AnalogOutput Config	CameraPorts Analog Output Signal-Route	CameraPorts Analog Output Write-Value
CameraPorts Digital-BiDirConfig	CameraPorts Digital-BiDirReadValue	CameraPorts Digital-BiDirSignalRoute	CameraPorts Digital-BiDirWriteValue	CameraPorts DigitalInput ReadValue	CameraPorts Digital Output Signal-Route	CameraPorts Digital Output Write-Value

\* A & S SERIES CAMERAS ONLY - \*\* A SERIES CAMERAS ONLY

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### System requirements

- ThermoVision™ LabView Digital Toolkit requires:
- Windows® 98 (2nd Edition), ME, 2000, NT 4.0, XP
  - A computer with Ethernet or FireWire interface or if a non A- or S-series camera is used then is a Digital Frame grabber needed (see below)
  - A FLIR Systems IR camera
  - DirectX 8.1 (or higher) installed on your computer if FireWire interface is used
  - DirectX 9.0b for XP
  - An installed and registered version of National Instruments LabVIEW® 6.1 or later, NI-IMAQ 2.5 or later, and IMAQ Vision 6.1 or later
  - An installed and registered version of ThermoVision™ Digital Toolkit.

### Recommended cameras

- ThermoVision A20 V FireWire (P/N 227 04 1 02 02) with motor focus (P/N 2270610202)  
ThermoVision A20 V Ethernet (P/N 227 08 1 04 05) with motor focus (P/N 227010405)  
ThermoVision A20 M FireWire (P/N 227 04 1 03 04) with motor focus (P/N 2270610304)  
ThermoVision A20 M Ethernet (P/N 227 08 1 05 06) with motor focus (P/N 2270610304)  
ThermoVision A40 V Ethernet (P/N 236 03 0 04 04)  
ThermoVision A40 V FireWire (P/N 236 02 0 02 02)  
ThermoVision A40 M Ethernet (P/N 236 03 0 05 05)  
ThermoVision A40 M FireWire (P/N 236 02 0 03 03)
- The ThermoVision LabView Digital Toolkit also works with following FLIR Camera models  
ThermoVision 320M (PAL P/N 1 199 716 / NTSC P/N 1 199 720)  
SC500 (PAL P/N 1 195 011 / NTSC P/N 1 195 012)  
SC2000 (PAL P/N 1 194 901 / NTSC P/N 1 195 902)  
SC3000 (High Speed NOT supported) (PAL P/N 194 745 / NTSC P/N 194 744)  
SC1000

If in doubt, please contact your local FLIR Systems distributor. Contact information can be found at <http://www.flirthermography.com>

### Necessary hardware & software

#### FLIR SYSTEMS SOFTWARE

- ThermoVision SDK (P/N 1 195 710)

Purchase information can be found at <http://www.flirthermography.com>

#### NATIONAL INSTRUMENTS SOFTWARE

- LabVIEW® Full Development System (P/N 776670-03)
- IMAQ Vision (P/N 777859-03)

Purchase information can be found at <http://www.ni.com>

#### FLIR SYSTEMS HARDWARE

##### (FOR CAMERAS WITHOUT FIREWIRE OR ETHERNET)

- Parallel interface P/N 194 441 (needs cable to frame-grabber)
- Cable P/N 194 452 (parallel interface to Imaging Technology frame-grabber)
- PC-Card Interface P/N 194 240

Purchase information can be found at <http://www.flirthermography.com>

#### NATIONAL INSTRUMENTS FRAME-GRABBER

##### (FOR CAMERAS WITHOUT FIREWIRE OR ETHERNET)

NOTE: Not applicable for A & S series cameras using FireWire/Ethernet.

- MAQ PCI 1422. RS-422 (P/N 777959-01)
- MAQ PCI 1424. RS-422 (P/N 777662-01)
- IMAQ PXI 1422. RS-422 (P/N 777933-01)

Purchase information can be found at <http://www.ni.com>