QUICK REFERENCE

NI-FGEN Instrument Driver

For information about which of these functions you can use with your NI signal generators module, refer to the *NI Signal Generators Help* at **Programs»National Instruments»NI-FGEN» Documentation**. The *NI Signal Generators Help* also contains detailed programming information for your module.

Initialize and Close

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_init**†		
	ViRsrc	resourceName	NI-DAQmx device name, or DAQ::#, where # is the device number assigned in Measurement & Automation Explorer (MAX)
	ViBoolean	IDQuery	VI_TRUE, VI_FALSE
	ViBoolean	resetDevice	VI_TRUE, VI_FALSE
	ViSession *	vi	Returned session handle for the device
	**niFgen_InitWithOptions**		
	ViRsrc	resourceName	NI-DAQmx device name, or DAQ::#, where # is the device number assigned in MAX
	ViBoolean	IDQuery	VI_TRUE, VI_FALSE
	ViBoolean	resetDevice	VI_TRUE, VI_FALSE
	ViString	optionString	String specifying simulation, range checking, instrument status querying, caching, and driver setup options
	ViSession *	vi	Returns session handle for this device
	**niFgen_close**		
	ViSession	vi	Instrument handle

Error

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ErrorHandler**		
	ViSession	vi	Instrument handle
	ViStatus	statusCode	Error status code
	ViChar[256]	errorMessage	Error message

† Function name for C, C++, LabWindows™/CVI™, and Visual Basic.

NATIONAL INSTRUMENTS™

Basic Instrument Operation

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ConfigureOutputMode**		
	ViSession	vi	Instrument handle
	ViInt32	outputMode	• NIFGEN_VAL_OUTPUT_FUNC • NIFGEN_VAL_OUTPUT_FREQ_LIST • NIFGEN_VAL_OUTPUT_ARB • NIFGEN_VAL_OUTPUT_SEQ
	**niFgen_ConfigureOutputEnabled**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViBoolean	enabled	• VI_TRUE (output enable) • VI_FALSE (output disable)
	**niFgen_InitiateGeneration**		
	ViSession	vi	Instrument handle
	**niFgen_AbortGeneration**		
	ViSession	vi	Instrument handle

Standard Function Output

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ConfigureStandardWaveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	waveform	• NIFGEN_VAL_WFM_SINE • NIFGEN_VAL_WFM_SQUARE • NIFGEN_VAL_WFM_TRIANGLE • NIFGEN_VAL_WFM_RAMP_UP • NIFGEN_VAL_WFM_RAMP_DOWN • NIFGEN_VAL_WFM_DC • NIFGEN_VAL_WFM_NOISE • NIFGEN_VAL_WFM_USER
	ViReal64	amplitude	Peak-to-peak amplitude in volts
	ViReal64	dcOffset	Offset in volts
	ViReal64	frequency	Frequency in hertz
	ViReal64	startPhase	Starting phase in degrees
	**niFgen_DefineUserStandardWaveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	wfmSize	Waveform size in samples
	ViReal64 [ ]	data	Waveform data scaled between –1 and 1

Standard Function Output (continued)

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ClearUserStandardWaveform**		
	ViSession	vi	Instrument handle
	ViConstStag	channelName	Channel name; always “0” for single channel

Frequency List Output

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_QueryFreqListCapabilities**		
	ViSession	vi	Instrument handle
	ViInt32 *	maxNumFLists	Maximum number of frequency lists
	ViInt32 *	minFListLength	Minimum frequency list length
	ViInt32 *	maxFListLength	Maximum frequency list length
	ViReal64 *	minFListDuration	Minimum frequency list duration in seconds
	ViReal64 *	maxFListDuration	Maximum frequency list duration in seconds
	ViReal64 *	fListDuration Quantum	Duration must be a multiple of this quantum
	**niFgen_CreateFreqList**		
	ViSession	vi	Instrument handle
	ViInt32	waveform	• NIFGEN_VAL_WFM_SINE • NIFGEN_VAL_WFM_SQUARE • NIFGEN_VAL_WFM_TRIANGLE • NIFGEN_VAL_WFM_RAMP_UP • NIFGEN_VAL_WFM_RAMP_DOWN • NIFGEN_VAL_WFM_DC • NIFGEN_VAL_WFM_NOISE • NIFGEN_VAL_WFM_USER
	ViInt32	fListLength	Frequency list length
	ViReal64 [ ]	frequencies	Array of frequency values of size fListLength
	ViReal64 [ ]	durations	Array of durations in seconds of size fListLength
	ViInt32 *	fListHandle	Returned frequency list handle
	**niFgen_ConfigureFreqList**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name, always “0” for single channel
	ViInt32	freqListHandle	Frequency list handle
	ViReal64	amplitude	Peak-to-peak amplitude in volts
	ViReal64	dcOffset	Offset in volts
	ViReal64	startPhase	Start phase in degrees
	**niFgen_ClearFreqList**		
	ViSession	vi	Instrument handle
	ViInt32	freqListHandle	Frequency list handle returned by NIFGEN_VAL_ALL_FLISTS

Arbitrary Waveform Output

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_QueryArbWfmCapabilities**		
	ViSession	vi	Instrument handle
	ViInt32 *	maxNumWfms	Maximum number of waveforms allowed
	ViInt32 *	wfmQuantum	All waveform sizes must be a multiple of this quantum
	ViInt32 *	minWfmSize	Minimum waveform size in samples
	ViInt32 *	maxWfmSize	Maximum waveform size in samples
	**niFgen_CreateArbWaveform**		
	ViSession	vi	Instrument handle
	ViInt32	wfmSize	Waveform size in samples
	ViReal64 [ ]	wfmData	Waveform data scaled between –1 and 1
	ViInt32 *	wfmHandle	Returned waveform handle
	**niFgen_CreateBinary16ArbWaveform**		
	ViSession	vi	Instrument handle
	ViInt32	wfmSize	Waveform size in samples
	ViInt16 [ ]	wfmData	Waveform data as 16-bit integers scaled between –32,768 and +32,767
	ViInt32 *	wfmHandle	Returned waveform handle
	niFgen Create WDT Arb Waveform VI (LabVIEW only)		
	ViSession	vi	Instrument handle
	ViBoolean	Use Waveform dT for Sample Rate	VI_TRUE, VI_FALSE
	LV WDT	waveform	Waveform data
	ViInt32 *	wfmHandle	Returned waveform handle
	**niFgen_ConfigureArbWaveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	wfmHandle	Waveform handle
	ViReal64	arbGain	Gain to apply to the waveform
	ViReal64	arbOffset	Offset to apply to the wavefrom in volts
	**niFgen_ClearArbWaveform**		
	ViSession	vi	Instrument handle
	ViInt32	wfmHandle	Waveform handle of waveform to be removed or NIFGEN_VAL_ALL_WAVEFORMS to clear all waveforms in memory

Waveform Write

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_AllocateWaveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	waveformSize	Waveform size in samples
	ViInt32 *	waveformHandle	Returned waveform handle
	**niFgen_SetWaveformNextWritePosition**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	waveformHandle	Waveform handle
	ViInt32	relativeTo	• NIFGEN_VAL_WAVEFORM_POSITION_START • NIFGEN_VAL_WAVEFORM_POSITION_CURRENT
	ViInt32	offset	The next write position is offset by this amount from the location specified by relativeTo
	**niFgen_WriteWaveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	waveformHandle	Waveform handle
	ViInt32	size	Number of samples to write
	ViReal64	data	Waveform data must be scaled between –1 and +1
	**niFgen_WriteBinary16Waveform**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	waveformHandle	Waveform handle
	ViInt32	size	Number of samples to write
	ViInt64 [ ]	data	Waveform data must be between –32,768 and +32,767
	niFgen Write WDT Arb Waveform VI (LabVIEW only)		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViBoolean	Use Waveform dT for Sample Rate	VI_TRUE, VI_FALSE
	ViInt32	waveformHandle	Waveform handle
	LV WDT	waveform	Waveform data

Arbitrary Sequence Output

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_QueryArbSeqCapabilities**		
	ViSession	vi	Instrument handle
	ViInt32 *	maxNumSeqs	Maximum number of sequences
	ViInt32 *	minSeqLength	Minimum sequence length
	ViInt32 *	maxSeqLength	Maximum sequence length
	ViInt32 *	maxLoopCount	Maximum loop count
	**niFgen_CreateArbSequence**		
	ViSession	vi	Instrument handle
	ViInt32	seqLength	Number of waveforms in the sequence to be created
	ViInt32 [ ]	wfmHandles	Array of waveform handles of size seqLength
	ViInt32 [ ]	wfmLoopCounts	Array of loop counts of size seqLength Either the number of loops or NIFGEN_VAL_INFINITE_LOOP
	ViInt32 *	seqHandle	Returned sequence handle
	**niFgen_CreateAdvancedArbSequence**		
	ViSession	vi	Instrument handle
	ViInt32	seqLength	Number of waveforms in the sequence
	ViInt32 [ ]	wfmHandles	Array of waveform handles of size seqLength
	ViInt32 [ ]	loopCounts	Array of loop counts of size seqLength or VI_NULL Either the number of loops or NIFGEN_VAL_INFINITE_LOOP
	ViInt32 [ ]	sampleCounts	Array of sample counts of size seqLength or VI_NULL Either the number of samples to generate or NIFGEN_VAL_WHOLE_BUFFER If VI_NULL, then each element is the whole buffer
	ViInt32 [ ]	markers	Array of markers of size seqLength or VI_NULL Either the marker position or NIFGEN_VAL_NO_MARKER If VI_NULL, then there are no markers
	ViInt32 [ ]	coercedMarkers	Returns an array indicating where each marker was coerced **Note**: The array must be an already allocated array of size seqLength or VI_NULL.
	ViInt32 *	seqHandle	Returned sequence handle
	**niFgen_ConfigureArbSequence**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	seqHandle	Sequence handle
	ViReal64	arbGain	Gain to apply to the waveform
	ViReal64	arbOffset	Offset to apply to the waveform in volts

Arbitrary Sequence Output (continued)

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ClearArbSequence**		
	ViSession	vi	Instrument handle
	ViInt32	seqHandle	Sequence handle
	**niFgen_ClearArbMemory**		
	ViSession	vi	Instrument handle

Configure Output

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ConfigureOutputImpedance**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViReal64	outputImpedance	• NIFGEN_VAL_50_OHMS • NIFGEN_VAL_75_OHMS
	**niFgen_EnableAnalogFilter**		
	niFgen Configure Analog Filter VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViReal64	filterCorrectionFreq	Filter correction frequency in hertz
	niFgen_DisableAnalogFilter		
	niFgen Configure Analog Filter VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	**niFgen_EnableDigitalFilter**		
	niFgen Configure Digital Filter VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	niFgen_DisableDigitalFilter		
	niFgen Configure Digital Filter VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel

Configure Output (continued)

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_EnableDigitalPatterning**		
	niFgen Configure Digital Patterning VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	niFgen_DisableDigitalPatterning		
	niFgen Configure Digital Patterning VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel

Configure Clock

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_ConfigureSampleRate**		
	niFgen Set Sample Rate VI		
	ViSession	vi	Instrument handle
	ViReal64	sampleRate	Sample rate in samples per second
	**niFgen_ConfigureRefClockSource**		
	ViSession	vi	Instrument handle
	ViInt32	refClockSource	• NIFGEN_VAL_CLK_IN • NIFGEN_VAL_REF_CLOCK_EXTERNAL • NIFGEN_VAL_REF_CLOCK_INTERNAL • NIFGEN_VAL_REF_CLOCK_RTSI_CLOCK • NIFGEN_VAL_PXI_CLK10 • NIFGEN_VAL_REF_IN • NIFGEN_VAL_RTSI_<0..6>
	**niFgen_ConfigureUpdateClockSource**		
	ViSession	vi	Instrument handle
	ViInt32	source	• NIFGEN_VAL_INTERNAL • NIFGEN_VAL_EXTERNAL • NIFGEN_VAL_CLK_IN • NIFGEN_VAL_DDC_CLK_IN • NIFGEN_VAL_PXI_STAR • NIFGEN_VAL_RTSI_<0..7>
	**niFgen_ConfigureClockMode**		
	ViSession	vi	Instrument handle
	ViInt32	clockMode	• NIFGEN_VAL_AUTOMATIC • NIFGEN_VAL_DIVIDE_DOWN • NIFGEN_VAL_HIGH_RESOLUTION

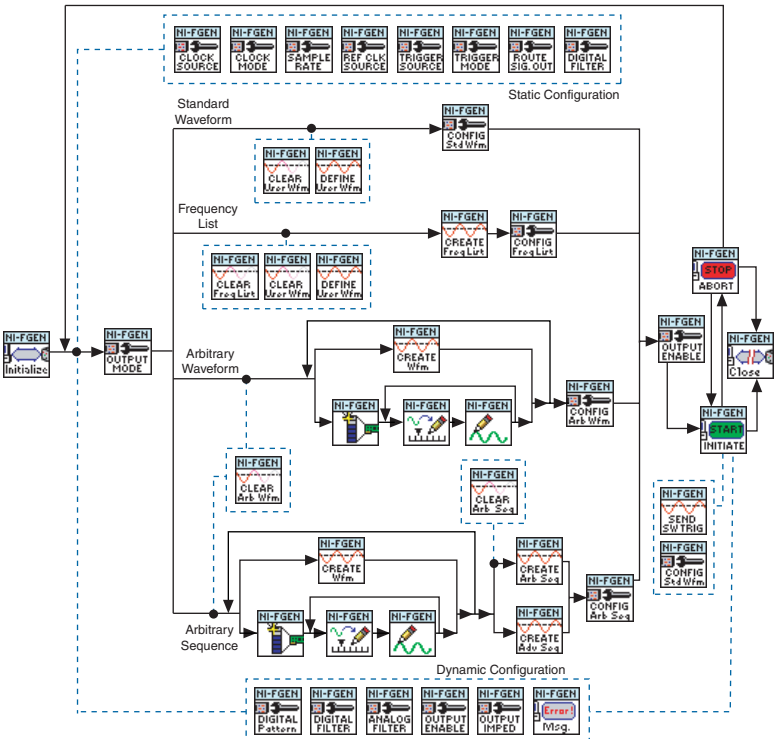
Configure Trigger & Synchronization

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_SendSoftwareTrigger**		
	ViSession	vi	Instrument handle
	**niFgen_ConfigureTriggerMode**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	mode	• NIFGEN_VAL_SINGLE • NIFGEN_VAL_CONTINUOUS • NIFGEN_VAL_STEPPED • NIFGEN_VAL_BURST
	**niFgen_ConfigureTriggerSource**		
	niFgen Configure Trigger VI		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	trigSource	• NIFGEN_VAL_IMMEDIATE • NIFGEN_VAL_EXTERNAL • NIFGEN_VAL_SOFTWARE_TRIG • NIFGEN_VAL_RTSI_<0..7> • NIFGEN_VAL_PFI_<0..3> • NIFGEN_VAL_PXI_STAR
	**niFgen_RouteSignalOut**		
	ViSession	vi	Instrument handle
	ViConstString	channelName	Channel name; always “0” for single channel
	ViInt32	source	• NIFGEN_VAL_NONE • NIFGEN_VAL_MARKER • NIFGEN_VAL_SYNC_OUT • NIFGEN_VAL_OUT_START_TRIGGER • NIFGEN_VAL_BOARD_CLOCK • NIFGEN_VAL_SYNCHRONIZATION • NIFGEN_VAL_SOFTWARE_TRIG • NIFGEN_VAL_REF_IN • NIFGEN_VAL_PXI_CLK10 • NIFGEN_VAL_PXI_STAR • NIFGEN_VAL_PFI_0 • NIFGEN_VAL_RTSI_<0..7> • NIFGEN_VAL_REF_CLOCK_RTSI_CLOCK • NIFGEN_VAL_CLOCK_OUT • NIFGEN_VAL_UPDATE_CLOCK • NIFGEN_VAL_PLL_REF_SOURCE
	ViInt32	destination	• NIFGEN_VAL_RTSI_<0..7> • NIFGEN_VAL_PFI_<0, 1, 4, 5> • NIFGEN_VAL_PXI_STAR • NIFGEN_VAL_DDC_CLK_OUT

Utilities

ICON	TYPE	PARAMETER	VALUE TO SET, COMMENTS
	**niFgen_Commit**		
	ViSession	vi	Instrument handle
	**niFgen_WaitUntilDone**		
	ViSession	vi	Instrument handle
	ViInt32	maxTime	Time to wait in milliseconds
	**niFgen_IsDone**		
	ViSession	vi	Instrument handle
	ViBoolean *	done	VI_TRUE, VI_FALSE
	**niFgen_reset**		
	ViSession	vi	Instrument handle
	**niFgen_ResetDevice**		
	ViSession	vi	Instrument handle

Programming Flow



Required programming sequence

Optional step

Optional branch in required programming sequence

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