Kowa External Control Library (Library Function)

v1.6.1

Kowa Optronics Co.,Ltd.

1. INTRODUCTION

KowaExternalControlLibrary is a control library for external devices connected to Kowa Optronics Co., Ltd. cameras. The following documents describe the library functions.

2. Kowa External Control Library

This chapter describes the functions of the Kowa External Control C/C++ library. The following example describes and explains the function:

Item	Contents
Function	A short description of the function.
Syntax	The function's syntax description in C/C++.
Parameter	Description of function parameters.
Description	Description of the purpose and use of the function.
Return	Here you find the type and range of the return values. Many functions return predefined error codes (`GEV_STATUS_...`). Please check `KowaGigE/errors.h` and `KowaGigE/gev_errors.h` for reference.
Reference	A list of related routines.

The following data types are treated as equivalent:

Type	Byte size
BYTE	1
WORD	2
DWORD	4
BOOL	4

2-1. REMOTEFOCUSUNIT CONTROL FUNCTIONS

2-1-1. RemoteFocusGetFWVersion

- Function

  Get the firmware version of the RemoteFocusUnit.

- Syntax

```
WORD RemoteFocusGetFWVersion(BYTE cam_nr, DWORD* fw_ver);
```

- Parameter
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `fw_ver`: It returns the firmware version of the RemoteFocusUnit. It returns the current version if the communication was successful, or 0 if it was not successful.
- Description

  This function gets the firmware version of the RemoteFocusUnit. This function allows you to check if the RemoteFocusUnit is properly connected.
- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

2-1-2. RemoteFocusAddStepCount

- Function

  Moves the focus position from the present position to NEAR position.
- Syntax

```
WORD RemoteFocusAddStepCount(BYTE cam_nr, DWORD step_count);
```

- Parameter
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `step_count`: It specifies the distance. If the end of the focus position is exceeded, the amount is ignored.
- Description

  It moves the focus position to NEAR by the specified amount from the current position.
- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

2-1-3. RemoteFocusSubStepCount

- Function

  Moves the focus position from the present position to FAR position.

- Syntax

```
WORD RemoteFocusSubStepCount(BYTE cam_nr, DWORD step_count);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `step_count`: It specifies the distance. If the end of the focus position is exceeded, the amount is ignored.

- Description

  It moves the focus position to FAR by the specified amount from the current position.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

2-1-4. RemoteFocusSetPPS

- Function

  Change motor speed.

- Syntax

```
WORD RemoteFocusSetPPS(BYTE cam_nr, DWORD pps);
```

- Parameter
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `pps`: It specifies how many pulses per second are sent to the motor.

- Description

This function sets the motor speed (pulse/sec). Use it when changing from the default value or the current setting value.
Check the hardware specifications for the optimal values. Specifying a value that is too large may cause a step-out.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetPPS

2-1-5. RemoteFocusGetPPS

- Function

  Gets the current motor speed.

- Syntax

```
WORD RemoteFocusGetPPS(BYTE cam_nr, DWORD* pps);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `pps`: It returns the number of pulses per second to send to the present motor.

- Description

  This function gets the current motor speed (pulse/sec).

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusSetPPS

2-1-6. RemoteFocusSetMotorPhase

- Function

Change motor excitation method.

- Syntax

```
WORD RemoteFocusSetMotorPhase(BYTE cam_nr, ENUM phase_type
motor_phase);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `motor_phase`: It specifies an enumerator for the motor's energization scheme (refer to the "Enumerators" section and KowaExternalControlLib.h in this document to define the enumerator "phase_type").

- Description

This function sets the motor excitation method (2-phase excitation or 1-2-phase excitation).
Use it when changing from the default value or the current setting value.
To move to the target focus position faster, set to 2-phase excitation.
To adjust the focus position more precisely, set 1-2 phase excitation.

- Return

Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

RemoteFocusGetMotorPhase

2-1-7. RemoteFocusGetMotorPhase

- Function

Gets the current motor excitation method.

- Syntax

```
WORD RemoteFocusGetMotorPhase(BYTE cam_nr, ENUM phase_type
motor_phase);
```

- Parameters

- `cam_nr`: It specifies the GigE Vision device instance [1..50].
- `motor_phase`: It returns an enumerator of the motor's energization scheme (refer to the "Enumerators" section and KowaExternalControlLib.h in this document for defining the enumerator "phase_type").

- Description

  This function acquires the currently set motor excitation method (2-phase excitation or 1-2-phase excitation).

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusSetMotorPhase

2-1-8. RemoteFocusSetOrigin

- Function

  Return the focus position to the origin.

- Syntax

```
WORD RemoteFocusSetOrigin(BYTE cam_nr);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].

- Description

  This function sends a command to return the focus position to the origin.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

2-1-9. RemoteFocusForceStop

- Function

Forcibly stops the motor.

- Syntax

```
WORD RemoteFocusForceStop(BYTE cam_nr);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
- Description

This function sends a command to forcibly stop the motor operation.

- Return

Error codes (See "Error Codes" in document "KowaGigESDK")

2-1-10. RemoteFocusGetInfo

- Function

Acquires the current status of the RemoteFocusUnit.

- Syntax

```
WORD RemoteFocusGetInfo(BYTE cam_nr, struct RemoteFocusInfo
*info);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `info`: It returns the out-of-step condition, motor operation status, focus position, home return operation status, and the number of slits that have passed since starting from the origin as a structure (For the definition of structure "RemoteFocusInfo", refer to "Structure" section and KowaExternalControlLib.h of this manual).
- Description

This function gets the current state of the RemoteFocusUnit as a structure.
Use the functions described in "Reference" below to obtain information individually.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetStepoutState
  RemoteFocusIsMotorBusy
  RemoteFocusGetStepCount
  RemoteFocusGetOriginState
  RemoteFocusGetSlitLocation

2-1-11. RemoteFocusGetFlags

- Function

  Get remote focus module error flags.

- Syntax

```
WORD RemoteFocusGetFlags(BYTE cam_nr, DWORD *flags);
```

- Parameters

  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `flags`: It returns an error flag (bit[0] 0: Normal 1: step-out, bit[4] 0: Normal 1: Focus Position Limit).

- Description

  This function gets the RemoteFocusUnit error flags.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetInfo

2-1-12. RemoteFocusIsMotorBusy

- Function

Gets the operating status of the motor.

- Syntax

```
WORD RemoteFocusIsMotorBusy(BYTE cam_nr, DWORD *busy);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `busy`: It returns the motor operating status (0:IDLE 1:BUSY).
- Description

  This function obtains the operating status of the motor.
- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")
- Reference

  RemoteFocusGetInfo

2-1-13. RemoteFocusGetStepCount

- Function

  Gets the current focus position.
- Syntax

```
WORD RemoteFocusGetStepCount(BYTE cam_nr, short *step_count);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `step_count`: It returns the focused position from the origin.
- Description

  This function gets the current focus position.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetInfo

2-1-14. RemoteFocusGetOriginState

- Function

  Acquires the operation status of return to origin.

- Syntax

```
WORD RemoteFocusGetOriginState(BYTE cam_nr, ENUM
origin_state_type *origin_state);
```

- Parameters

  - `cam_nr`: It specifies the GigE Vision device instance [1..50]. `origin_state` It returns the enumerator corresponding to the status of the return to origin operation (see the "Enumerator" section and KowaExternalControlLib.h of this document for the definition of the enumerator "origin_state_type").

- Description

  This function acquires the operation status of origin return.
  Check the status with this function during the Origin Return operation, and perform the next operation after the Origin Return operation is completed.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetInfo

2-1-15. RemoteFocusGetSlitLocation

- Function

Obtains the number that has passed through the slit inside the unit.

- Syntax

```
WORD RemoteFocusGetSlitLocation(BYTE cam_nr, DWORD
*slit_location);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `slit_location`: It returns the number of slits that have passed from the origin.
- Description

  The RemoteFocusUnit has a slit inside, which is used as a reference to return to the home position.
  This function obtains the number of slits that have passed from the origin.
  This function is intended for maintenance and does not need to be called when using the RemoteFocusUnit.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  RemoteFocusGetInfo

2-2. PWM CONTROL FUNCTION

2-2-1. PwmSetParameter

- Function

  Set PWM control parameters.

- Syntax

```
WORD PwmSetParameter(BYTE cam_nr, DWORD mode, DWORD delay,
DWORD width, DWORD duty);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `mode`: It specifies the triggering method (0:MANUAL 1:STROBE).
  - `delay`: It determines how long the flash will fire after a STROBE trigger.
  - `width`: It specifies the duration of STROBE output.
  - `duty`: It specifies PWM control duty cycle in STROBE from 6% (0) to 100% (15) in 16 steps.
- Description

  It sets the parameters for PWM control.
- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")
- Reference

  PwmGetParameter

2-2-2. PwmGetParameter

- Function

  Get parameters related to PWM control.
- Syntax

```
WORD PwmGetParameter(BYTE cam_nr, DWORD& mode, DWORD& delay,
DWORD& width, DWORD& duty);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `mode`: It returns the configured triggering method (0:MANUAL 1:STROBE).
  - `delay`: It returns the time from the trigger to the flash in STROBE mode.

- `width`: It returns the duration when STROBE is active.
- `duty`: It returns the duty cycle of PWM control set in STROBE from 0 (6%) to 15 (100%), in 16 steps.

- Description

  It retrieves the parameters for PWM control.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

- Reference

  PwmSetParameter

2-2-3. PwmSetManualCtrl

- Function

  Sends a command to turn PWM control on/off (MANUAL only).

- Syntax

```
WORD PwmSetManualCtrl(BYTE cam_nr, DWORD enable);
```

- Parameters
  - `cam_nr`: It specifies the GigE Vision device instance [1..50].
  - `enable`: It specifies ON/OFF of PWM (0:OFF 1:ON).

- Description

  It sends a command to turn PWM control on/off.

- Return

  Error codes (See "Error Codes" in document "KowaGigESDK")

2-3. STRUCTURES

2-3-1. RemoteFocusInfo

flags:
Error flag (bit[0]:Step-out flag bit[4]:Focus position limit flag)

is_busy:
Operating status of the motor (0:IDLE 1:BUSY)

step_count:
Current focus position

origin_state:
Origin return operation status (refer to the "Enumerator" section and KowaExternalControlLib.h in this document for the enumerator "origin_state_type" definition)

slit_location:
Passing number of slits (see `RemoteFocusGetSlitLocation` function for slits)

2-4. ENUMERATOR

2-4-1. phase_type

Motor excitation method

Name	Value	Description
pt_full_step	0	2-phase Excitation
pt_half_step	1	1-2 Phase Excitation

2-4-2. origin_state_type

Origin return operation status

Name	Value	Description
ost_not_implemented	0	Not performed
ost_complete	1	Complete
ost_operating	2	Running
ost_error	3	Failed