

Connect SDK

of

Optris PIX Connect Software

Version 2

(PIX Connect Rel. 3.17.3097.0 and ImagerIPC2.dll 2.8.2048.0)

The communication to the process imager device is handled by the optris PIX Connect software (Imager.exe) only. Optris supplies a dynamic link library (ImagerIPC2.dll) that serves the **Inter Process Communication (IPC)** for other attached processes. The DLL can be dynamically linked into the secondary application (client application). Or it can be done static by a lib file too.

Both Imager.exe and ImagerIPC2.dll are designed for MS Windows 7/8/10/11.

There is also an ImagerIPC2x64.dll to support Intel 64 bit platforms.

The ImagerIPC2.dll will export a bunch of functions that are responsible for initiating the communication, retrieving data and setting some control parameters.

You will find a short roadmap to start with a project at the end of this document.

The main difference to the former Version 1 (ImagerIPC.dll) is the support of more than one optris imager via multiple instances of optris PIX Connect.

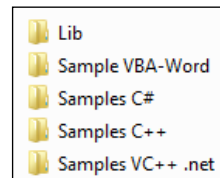
On the optris PIX Connect flash drive you will find some samples to check out how the IPC is working.

Sample name	Progr.Platform	Description
Start IPC2	C++/CLI	A simple program to demonstrate basic concepts of IPC2 with C++/.NET
Start IPC2 Extensive	C++/CLI	A program to demonstrate advanced concepts of IPC2
Start IPC2 VisCam	C++/CLI	A program to demonstrate communication on both channels IR and Visible (if available)
Start MultiIPC2	C++/CLI	A program to demonstrate the multiple instance capabilities of IPC2
Start ListAreas	C++/CLI	A program to demonstrate how to configure measure areas
Start IPC2 Fast Measuring	C++/CLI	A program to demonstrate how to receive frames and/or measure area readings and alarms with full device framerate
Start IPC2 Win32	C++	A simple Win32 program as a classical Windows-application
Start IPC Console Polling	C	A simple console program using polling
Start IPC Console CB	C	A simple console program using callbacks
Start IPC CSharp	C#	A simple C# program using callbacks or polling
PI in Word	VBA / Word	Simple macro's embedded in a MS Word Document

Connect SDK

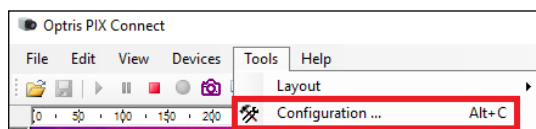
Settings in PIX Connect software:

To use the Connect SDK, the PIX Connect software has to run and the following settings have to be made. First of all connect the imager via USB/Ethernet to the PC. Start the software, go to the menu **Tools** and **Configurations**, choose **External Communication** and activate **Connect SDK (IPC)**.

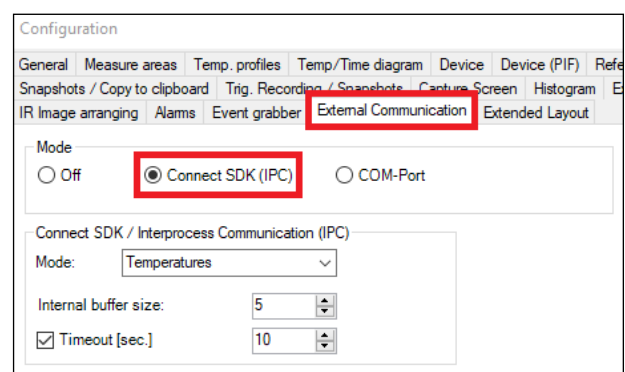


Samples for Connect SDK from Optris

Note: The samples can be found under the software menu **Help** and **Connect SDK**.



Menu Tools and Configuration



Configuration window: External Communication

Content

Content	3
1 Init procedure	5
1.1 Init	5
1.2 Setting callbacks	6
1.3 Run	7
1.4 Clean up	7
2 Callbacks (Events)	8
2.1 OnServerStopped	8
2.2 OnFrameInit	8
2.3 OnNewFrame	8
2.4 OnNewFrameEx (supported as of PI Connect 2.0) OnNewFrameEx2 (supported as of PIX Connect 3.0)	9
2.5 OnVisibleFrameInit, OnNewVisibleFrame, OnNewVisibleFrameEx / OnNewVisibleFrameEx2	9
2.6 OnAreasInit	9
2.7 OnNewAreasBuffer	9
2.8 OnInitCompleted	10
2.9 OnConfigChanged	10
2.10 OnFileCommandReady	10
2.11 OnNewNMEAString	10
3 Polling	11
4 Debug logging	14
5 Video frames	15
6 Measure areas	17
6.1 Standard retrieving of measure areas	17
6.2 Fast acquiring of measure areas	17
6.3 Setting up measure areas	18
7 Other data	20
7.1 Single temperature information	20
7.2 IR Image Arranging	20
7.3 Flag	21
7.4 Optics	21
7.5 Temperature Ranges	23
7.6 VideoFormats	24
7.7 Measuring settings	26
7.8 Alarm settings	26
7.9 Process Interface (PIF) settings	27
7.10 Focus control	28
7.11 Getting version information	28
7.12 Application appearance	28
7.13 File management	29
7.14 Layout management	31
7.15 Other commands	32
8 Appendix	34

Connect SDK

8.1	Roadmap for an application that uses the ImagerIPC2.dll.....	34
8.2	Data type definition for this document	36

Connect SDK

1 Init procedure

1.1 Init

The application that uses the `ImagerIPC2.dll` must first call the `SetImagerIPCCount`-function to setup the count of imagers (respectively the number of instances of optris PIX Connect):

Function	Description
<code>SetImagerIPCCount</code>	Sets the number of imagers

Parameters: Number of imagers (unsigned short)

Return value: Error/Success code (HRESULT)

After that the `InitImagerIPC`- or the `InitNamedImagerIPC`-function must be called for any imager:

Function	Description
<code>InitImagerIPC</code>	Initiziates the IPC
<code>InitNamedImagerIPC</code>	Initiziates the IPC to an instance of imager.exe that was called with an instance name

Parameters: `InitImagerIPC` :
 - Imager index (unsigned short)

`InitNamedImagerIPC` :
 - Imager index (unsigned short)
 - Instance name (wchar_t*)

Return value: Error / Success code (HRESULT).

The `InitNamedImagerIPC`-function is needed if the PIX Connect software was called with an instance name (command prompt parameter `"/name=xxx"`).

If the return value signals no success (less than zero) you can call the function again and again to wait for answer of the imager.exe.

After this "Init" command is the point to decide to operate with callbacks or in polling mode. The callback mode is enabled with setting at least one callback function. If no callback function is set between the call of "Init" and "Run" function the IPC will operate in polling mode and expect repeatedly calls of `GetFrame()`, `GetAreas()` and `GetIPCState()`.

In most samples you will find a compiler switch "POLLING". Uncommenting or not defines whether the application will be compiled for polling mode or not.

Connect SDK

1.2 Setting callbacks

If the "Init" function was successful and the user wants to operate in callback mode the "SetCallback_XXXX" functions have to be executed to load pointers to the callback functions (or delegates in .net):

Function	Description
<code>SetCallback_OnServerStopped</code>	Sets the <code>OnServerStopped</code> event, it occurs if imager connect stops the IPC
<code>SetCallback_OnFrameInit</code>	Sets the <code>OnFrameInit</code> event, it occurs before the first frame will be sent
<code>SetCallback_OnNewFrame</code> , <code>SetCallback_OnNewFrameEx</code> , <code>SetCallback_OnNewFrameEx2</code>	Sets the <code>NewFrame</code> event, it occurs for any new video frame, only one of three callbacks should be set
<code>SetCallback_OnVisibleFrameInit</code>	Sets the <code>OnVisibleFrameInit</code> event (for the channel of the visible cam)
<code>SetCallback_OnNewVisibleFrame</code> , <code>SetCallback_OnNewVisibleFrameEx</code> , <code>SetCallback_OnNewVisibleFrameEx2</code>	Sets the <code>NewVisibleFrame</code> event (for the channel of the visible cam). Only one of three should be set.
<code>SetCallback_OnAreasInit</code>	Sets the <code>OnAreasInit</code> event, it occurs before the first buffer with areas will be sent
<code>SetCallback_OnNewAreasBuffer</code>	Sets the <code>NewAreasBuffer</code> event, it occurs for any new buffer of measure areas (values and alarms)
<code>SetCallback_OnInitCompleted</code>	Sets the <code>OnInitCompleted</code> event, it occurs if the IPC initialization is complete
<code>SetCallback_OnConfigChanged</code>	Sets the <code>OnConfigChanged</code> event. It occurs if the configuration of PIX Connect has changed
<code>SetCallback_OnFileCommandReady</code>	Sets the <code>OnFileCommandReady</code> event. It occurs if the resulting files have been written (e.g. Snapshot, Record,...)
<code>SetCallback_OnNewNMEAString</code>	Sets the <code>OnNewNMEAString</code> event. It occurs if a new NMEA string is available.

Parameters:

- Imager index (unsigned short)
- a function pointer (or delegate in .NET) that matches the callback function

Return value:

Error / Success code (HRESULT).

When working with multiple instances, any instance must have its own set of callback functions. And the appropriate pointers must be set with the SetCallback-functions. After the `OnInitCompleted` event is occurred all other functions to retrieve or set values are ready to be called. Don't try to use get or set function before this callback was called.

After a short time the DLL will give

- an `OnFrameInit` event that provide width, height and depth of the frames and/or
- an `OnAreasInit` event that provide number of measure areas and size of the measure area buffer.

The application can now allocate memory for its own purposes.

Connect SDK

1.3 Run

Now the application should call the `RunImagerIPC`-function. In callback mode it is important to set all callbacks before you call this function. `RunImagerIPC` must be called for any imager:

Function	Description
<code>RunImagerIPC</code>	Runs the IPC

- Parameters:**
- Imager index (unsigned short)
- Return value:**
- Error/Success code (HRESULT).

The `RunImagerIPC`-function notifies the optris PIX Connect software the initialization is ready and the data transmission can begin.

If the return value signals no success (less than zero) you should start over with the initialization procedure.

1.4 Clean up

Function	Description
<code>ReleaseImagerIPC</code>	Stops the IPC

- Parameters:**
- Imager index (unsigned short)
- Return value:**
- Error/Success code (HRESULT)

The Release-function should be called to stop the communication with the Imager.exe in the following situations:

- On closing the application
- After an `OnServerStopped` event
- If the application don't use the IPC any longer.
- Before connecting to another instance (`InitNamedImagerIPC`)

2 Callbacks (Events)

When operating in callback mode for any function pointer you handle with a set-callback-function an appropriate function must be defined. If you are working with more than one imager you need multiple definitions of the functions too. These functions that are called by the IPC are listed in the following:

2.1 OnServerStopped

Parameters: Reason (int)

- 0 → imager.exe has closed the IPC regularly
- 1 → imager.exe does not communicate any longer

Return value: Success (HRESULT), 0 to signal success

Note: Some actions of the imager.exe need some drastic re-allocating of objects within the imager.exe. Therefore the imager.exe will relaunch the IPC and call the `OnServerStopped` event also after this actions. For that reason your application should be able to respond to that by reinitializing the IPC.

2.2 OnFrameInit

Parameters:

1. Width (int): width of the video frame
2. Height (int): height of the video frame
3. Depth (int): bytes for any pixel (always 2)

Return value: Success (HRESULT), 0 to signal success

This function will be called prior to the first call of `OnNewFrame` and gives you the opportunity to allocate memory or create objects that depends from the size of the video frames. The size of the buffer that will contain the video data is $\text{Width} \times \text{Height} \times \text{Depth}$.

2.3 OnNewFrame

Parameters:

1. Buffer (char*): pointer to the buffer that contains the video frame
2. FrameCounter (int): the internal frame counter of imager.exe

Return value: Acknowledge (HRESULT)

0: force the imager.exe to send the next frame as soon as it is possible.
< 0: the imager.exe will wait for calling the `AcknowledgeFrame` function prior sending the next frame

Connect SDK

2.4 OnNewFrameEx (supported as of PI Connect 2.0) OnNewFrameEx2 (supported as of PIX Connect 3.0)

Parameters:

1. Buffer (char*): pointer to the buffer that contains the video frame
2. pMetadata (FrameMetadata* / FrameMetadata2*): pointer to the metadata structure that contains additional informations to the frame

Return value: See the OnNewFrame-event

2.5 OnVisibleFrameInit, OnNewVisibleFrame, OnNewVisibleFrameEx / OnNewVisibleFrameEx2

Same as OnFrameInit, OnNewFrame, OnNewFrameEx, OnNewFrameEx2 but for the channel of the visible camera. The buffers of the OnNewVisibleFrame and OnNewVisibleFrameEx events always contain YUV values (16 bit).

2.6 OnAreasInit

Parameters:

1. areaCount (int): The count of measuring areas (including calculated objects)
2. areasBufferSize (int): Size of the areas buffer.

Return value: Success (HRESULT), 0 to signal success

This function will be called prior to the first call of OnNewAreasBuffer and gives you the opportunity to allocate memory or create objects that depends from the size of the number of areas.

2.7 OnNewAreasBuffer

Parameters:

1. Buffer of the measuring areas. This buffer contains two arrays:
 - a float array with length of area count that contains the values of the measure areas. Area count is the value you got from OnAreasInit event. This float array is followed by
 - a byte array with length of area count that contains the alarm states of the measure areas.
2. pMetadata (FrameMetadata2*): pointer to the metadata structure that contains additional informations to the frame

Return value: Should be 0.

Connect SDK

2.8 OnInitCompleted

- Parameters:** -
- Return value:** - Success (HRESULT), 0 to signal success

The DLL calls this function to notify that the initialization is completed. You must wait for this event before you can use any other function.

2.9 OnConfigChanged

- Parameters:** - Reserved (long)
- Return value:** - Success (HRESULT), 0 to signal success

The DLL calls this function to notify that the configuration has changed. If this event has occurred you should re-read all information from the imager that is important for you.

2.10 OnFileCommandReady

- Parameters:** - path (wchar_t*) : The complete path to the file name of the stored file (Ravi or snapshot)
- Return value:** - Success (HRESULT), 0 to signal success

This event notifies that a file was successfully stored.

2.11 OnNewNMEAString

- Parameters:** - NMEA string (wchar_t*) : **Recommended Minimum Sentence C** (RMC), containing the GPS information acquired during frame acquisition.
- Return value:** - Success (HRESULT), 0 to signal success

This event notifies about a availability of a new NMEA-String.

Connect SDK

3 Polling

If your application cannot deal with callbacks or if you have other reasons for it you can also use polling to acquire all data from the IPC. In this case you must not set any of the `SetCallback_XXXX` functions but must repeatedly call the following functions. You can do this controlled by a timer or if the application is in idle state.

Function	Description
<code>GetIPCState</code>	Get information about events that happened in the DLL

- Parameters:**
- Imager index (unsigned short)
 - Reset (bool)
- Return value:**
- Returns the events that are occurred in the DLL

If the DLL shall reset existing events, the Reset parameter must be set to true (normal operation). The appropriate bit will not be set on the next call of the function until the event occurs again. The return value can be interpreted as a bitfield with the following bits:

Bit	Name of bit	Corresponding event	Function that should be called after event:
0	IPC_EVENT_INIT_COMPLETED	OnInitCompleted	
1	IPC_EVENT_SERVER_STOPPED	OnServerStopped	
2	IPC_EVENT_CONFIG_CHANGED	OnConfigChanged	
3	IPC_EVENT_FILE_CMD_READY	OnFileCommandReady	GetPathOfStoredFile
4	IPC_EVENT_FRAME_INIT	OnFrameInit	GetFrameConfig
5	IPC_EVENT_VIS_FRAME_INIT	OnVisibleFrameInit	GetVisibleFrameConfig
6	IPC_EVENT_NEW_NMEA_STRING	OnNewNMEAString	
7	IPC_EVENT_FILE_COMMAND	OnNewFileCommand	
8	IPC_EVENT_PLAY_METADATA *)	OnPlayMetadata	
9	IPC_EVENT_LSSLIT_CENTER *)	OnLinescannerSlitCenterLine	
10	IPC_EVENT_NEW_RAWFILESTATE *)	OnNewRawFileState	
11	IPC_EVENT_AREAS_INIT	OnAreasInit	GetAreasConfig

*) internal use only

After the `IPC_EVENT_FRAME_INIT` or `IPC_EVENT_VIS_FRAME_INIT` bit was set, you should call the following function to retrieve information about the size of the video frames. According to the `OnFrameInit` or `OnVisibleFrameInit` event you can use this information to create resources that depend on the size of the video frames.

Function	Description
<code>GetFrameConfig</code> , <code>GetVisibleFrameConfig</code>	Return Width, Height, Depth

- Parameters:**
- Imager index (unsigned short)
 - Width (int*): width of the video frame
 - Height (int*): height of the video frame
 - Depth (int*): bytes for any pixel (always)

Connect SDK

Return value: - Error/Success code (HRESULT)

After the `IPC_EVENT_AREAS_INIT` bit was set, you should call the following function to retrieve information about the number of measure areas. According to the `OnAreasInit` event you can use this information to create resources that depend on the number of measure areas.

Function	Description
GetAreasConfig	Return Width, Height, Depth

Parameters:

- Imager index (unsigned short)
- `areaCount (int*)`: number of measure areas
- `areasBufferSize (int*)`: size of the areas buffer

Return value: - Error/Success code (HRESULT)

After the `IPC_EVENT_FILE_CMD_READY` bit was set, you should call the following function to retrieve the complete path of the file that was stored.

Function	Description
GetPathOfStoredFile	Returns the path of the stored file (Ravi or snapshot)

Parameters:

- Imager index (unsigned short)
- Pointer to the string buffer that return the filename (`wchar_t*`)
- Max length of the string buffer (int)

Return value: - Error / Success code (HRESULT)

Function	Description
GetNewNMEAString	Returns the NMEA/GPS string (flight record)

Parameters:

- Imager index (unsigned short)
- Pointer to the string buffer that return the filename (`wchar_t*`)
- Max length of the string buffer (int)

Return value: - Error / Success code (HRESULT)

Appropriate to the events `OnNewFrameEx` and `OnNewVisibleFrameEx` there are functions to retrieve frames from the IPC:

Function	Description
GetFrame and GetVisibleFrame GetFrame2 and GetVisibleFrame2	Return frames with data and metadata

Parameters:

- Imager index (unsigned short)
- Timeout (unsigned short) in msec.
- Pointer to the buffer that return data (`void*`)

Connect SDK

- Buffer size (unsigned int)
- Pointer to metadata FrameMetadata* or FrameMetadata2*
- Exclusiv. for GetFrame2: size for metadata
- Error / Success code (HRESULT)

Return value:

In order to use the GetFrame2 function, the size of the metadata is required. The call of the following function is required:

Function	Description
GetFrameMetadataSize	Returns the flexible size of FrameMetadata2 struct

Parameters:

- Imager index (unsigned short)
- Pointer to metadata size (int)

Return value:

- Error / Success code (HRESULT)

To prevent calling OnNewFrameEx, OnNewVisibleFrameEx or OnNewAreasBuffer more than necessary or to see how far behind you are from the most recent frame it is possible to ask how many entries are in the frame queue:

Function	Description
GetFrameQueue, GetVisibleFrameQueue, GetAreasQueue	Return number of entries in the frame or areas queue

Parameters:

- Imager index (unsigned short)

Return value:

- Number of queue entries (unsigned short)

4 Debug logging

The interprocess communication offers debug logging capability for multiple applications. One option for enable logging is to specify a log file the following function:

Function	Description
SetLogFile	Set initial parameters for logging process.

- Parameters:**
- Path/Name of the log file(wchar_t*)
 - Logging levels: init(0), command(1), frame(2), frameplus(3) (integer)
 - Append to log file (bool)
- Return value:**
- Error / Success code (HRESULT)

A second possibility to enable the logging functionality can be achieved by calling:

Function	Description
SetLogging	Set initial parameters for logging process.

- Parameters:**
- Logging group (32-bit mask)
LOGGRP_INIT(bit0)
LOGGRP_ALIVE(bit1)
LOGGRP_FRAME(bit 2)
LOGGRP_FRAMEINIT(bit 3)
LOGGRP_STRING(bit 4)
LOGGRP_STATE(bit 5)
LOGGRP_COMMAND(bit 6)
LOGGRP_DEVINFO(bit 7)
LOGGRP_DEVSETUP(bit 8)
LOGGRP_DEVDATA(bit 9)
LOGGRP_SYSINFO(bit 10)
- Return value:**
- Error / Success code (HRESULT)

The logging command for custom log messages is defined as follows. Messages can be assigned to a distinct logging level. Levels can be used to group different events.

Function	Description
Log	Logs an event

- Parameters:**
- Imager index (int)
 - String to log (char *)
 - Logging levels (int):
init(0)
command(1)
frame(2)
frameplus(3)
- Return value:**
- Error / Success code (HRESULT)

5 Video frames

After the initialization the IPC will call the callback function `OnFrameInit`. Or the user gets this event after a call to `GetIPCState`. Here the user can allocate memory or create objects that needs the size of the video frame.

Thereafter the first `OnNewFrame` callback function will be called or the user calls the `GetFrame` function. The application can read out the data of the buffer according to width/height/depth and can do with the data what it wants to do.

In case of callbacks: If the `OnFrameInit` function returns with zero the next frame will be send if it is available. If the return value is less than zero the application has to call the `AcknowledgeFrame` function later.

With both methods the secondary application can control the frame rate it wants to process frames.

Function	Description
AcknowledgeFrame	Notify the imager.exe to send the next frame after you left the <code>OnNewFrame</code> callback function with a return value less than zero

- Parameters:**
- Imager index (unsigned short)
- Return value:**
- Error/Success code (HRESULT)

In theory the full frame rate (device frame rate) could be transferred if the main application is setup with the option "Keep device framerate" (otherwise the frame rate of the IPC is the same as the display frame rate). Practically it depends from the computer hardware and from the effort the application has to process the data.

Because the depth/data size is always 2 bytes, any pixel represents a 16 bit value. In the Imager.exe the content of the frame information can be chosen:

1. AD-Values (energy): Pixels contain pre-corrected energy values. For most applications this will be meaningless.
2. Temperature values: Pixels contain temperatures in °C. Depending from the return value of the `GetTempRangeDecimal`, the temperature can be calculated by the formulas:
 - 1 decimal place: $T[°C] = (\text{value} - 1000) / 10$
 - 2 decimal places: $T[°C] = \text{value} / 100$
3. YUV-colour values: Any macro-pixel (two neighbouring pixels in a row) contains the YUV colour information of two pixels.

To obtain this IPC mode you can use the following function:

Function	Description
GetIPCMode	Returns the IPC mode.

- Parameters:**
- Imager index (unsigned short)
- Return value:**
- Mode (unsigned short):
0 = Colors, 1 = Temp, 2 = ADU

Connect SDK

To set the IPC mode use the following function:

Function	Description
SetIPCMode	Sets the IPC mode.

- Parameters:**
- Imager index (unsigned short)
 - Mode (unsigned short):
0 = Color, 1 = Temp, 2 = ADU
- Return value:**
- Mode (unsigned short)

Number of decimal places for temperature values:

Function	Description
GetTempRangeDecimal	Returns the number of decimal places for the temperature values of the matrix.

- Parameters:**
- Imager index (unsigned short)
 - EffectiveValue (bool)
- Return value:**
- Number of decimal places (unsigned short)

The number of decimal places can be 1 or 2. This depends from the calibration of the temperature range.

If the parameter EffectiveValue is set to true the function returns the effective value for the number of decimal places that is depending from the calibrated data and from the checkbox "High resolution temperatures" on tab "Device" in the configuration dialog. This information is needed to determine in which format the temperature values of the matrix will be send:

Decimal places	Data format for temperature values	Formula to calculated the floating point value:	Example:
1	Unsigned short	$T[^{\circ}\text{C}] = (\text{value} - 1000) / 10$	value = 1235 $\rightarrow T = 23.5^{\circ}\text{C}$
2	Signed short	$T[^{\circ}\text{C}] = \text{value} / 100$	value = 2357 $\rightarrow T = 23.57^{\circ}\text{C}$

The 16 bit values are arranged in lines. That means the first word in the buffer is the first (most left) pixel in the first line. It follows the second pixel of the first line. ... up to the last (most right) pixel of the first line. It follows the second line and so on. The following scheme demonstrates the arrangement of the pixels for a 160x120 matrix:

rows	0	1	2	columns	157	158	159
0	0	1	2	...	157	158	159
1	160	161	162	...	317	318	319
2	320	321	322	...	477	478	479
...
119	19080	19081	19082	...	19197	19198	19199

6 Measure areas

6.1 Standard retrieving of measure areas

Use these functions to retrieve temperatures of each measure area by a separate call, the values are updated with a frequency of approx. 10 Hz:

Function	Description
<code>GetMeasureAreaCount</code>	Get the number of defined measure areas
<code>GetTempMeasureArea</code>	Get the temperature of a measure area

First call `GetMeasureAreaCount` to retrieve the count of measure areas:

- Parameters:** - imager index (unsigned short)
- Return value:** - count of measure areas (unsigned short)

Then call `GetTempMeasureArea` to get the temperature for any area:

- Parameters:** - imager index (unsigned short)
- index of the measure area (unsigned long)
- Return value:** - temperature in °C (float)

6.2 Fast acquiring of measure areas

For a fast acquiring of measure area values (up to the device frequency) it is needed to operate with the callback `OnNewAreasBuffer`. This and also the callback `OnAreasInit` must be set by its set-callback-functions.

After the initialization the IPC will call the callback function `OnAreasInit` if the corresponding callback was set. Or the user gets this event after a call to `GetIPCState`. Here the user can allocate memory or create objects that needs the size number of measure areas or the areas buffer size.

Thereafter the first `OnNewAreasBuffer` callback function will be called or the user calls the `GetAreas` function. The application can read out the data of the buffer to get value and alarm state of any measure area.

The buffer of the measuring areas contains two arrays:

- a float array with length of area count that contains the values of the measure areas. Area count is the value you got from `OnAreasInit` event. This float array is followed by
- a byte array with length of area count that contains the alarm states of the measure areas.

Connect SDK

6.3 Setting up measure areas

Use these functions to get and set the location of any measure area instantaneously:

Function	Description
<code>GetLocMeasureArea</code>	Get the location of a measure area
<code>SetLocMeasureArea</code>	Set the location of a measure area

First call `GetMeasureAreaCount` to retrieve the count of measure areas:

- Parameters:**
- imager index (unsigned short)
 - index of the measure area (unsigned long)

`GetLocMeasureArea:`

- Location of measure area (POINT)

`SetLocMeasureArea:`

- Location of measure area (POINT*)

- Return value:**
- Error/Success code (HRESULT)

An Extended functionality for creating, manipulating and deleting measure areas are provided by the following functions:

Function	Description
<code>RemoveMeasureArea</code>	Deletes a measure area
<code>GetMeasureArea</code>	Gets a struct which represents a measure area
<code>SetMeasureArea</code>	Sets a measure area using a struct

- Parameters:**
- imager index (unsigned short)
 - index of the measure area (unsigned long)

`SetMeasureArea/GetMeasureArea:`

- measure area attributes (MeasureArea)

`SetMeasureArea:`

- The value indicates, if an existing area is changed or a new area is added. If true, area is appended, index of area is neglected. (bool)

- Return value:**
- Error / Success code (HRESULT)

The name of a measure area can be defined/ retrieved by using the functions:

Function	Description
<code>SetMeasureAreaName</code>	Set the measure area's name.
<code>GetMeasureAreaName</code>	Get the measure area's name.

- Parameters:**
- imager index (unsigned short)
 - index of the measure area (unsigned long)
 - name of the measure area (wchar_t*)

`GetMeasureAreaName:`

- length of the retrieved area name (int*)

Connect SDK

- Return value:**
- maximal length of the name (int)
 - Error / Success code (HRESULT)

If the shape of a measure area is a polygon or a spline curve it is possible to add new corner points to the shape:

Function	Description
AddMeasureAreaPoint	Add a corner point to a polygone or spline curve.

- Parameters:**
- imager index (unsigned short)
 - index of the measure area (unsigned long)
 - coordinate of the new point (POINT) of this measure area
- Return value:**
- Error / Success code (HRESULT)

7 Other data

All other data can be retrieved or manipulated by a couple of “Get” and “Set” functions. The following functions will be available for the user:

7.1 Single temperature information

These functions retrieve temperatures:

Function	Description
GetTempTec	Temperature of the thermo-electric cooler
GetTempChip	Get the temperature of the bolometer chip
GetTempFlag	Get the temperature of the flag
GetTempProc	Get the temperature of the processor
GetTempBox	Get the temperature of the box
GetTempHousing	Get the temperature of the housing
GetTempTarget	Get the temperature of the main measuring area

- Parameters:** - Imager index (unsigned short)
- Return value:** - temperature in °C (float)

The only temperature you can set is that of the thermo-electric cooler:

Function	Description
SetTempTec	Temperature of the thermo-electric cooler

- Parameters:** - Imager index (unsigned short)
- Set temperature in °C (float)
- Return value:** - temperature in °C (float).

7.2 IR Image Arranging

IR Arranging is both rotation of the image and zoom (changing the size). With the following function you can set and get both in one structure (see definition in the appendix).

Function	Description
GetIRArranging	Get the complete IRArranging struct
SetIRArranging	Set the complete IRArranging struct

- Parameters:** - imager index (unsigned short)
- IR Arranging struct (IRArranging*)
- Return value:** - Error / Success code (HRESULT)

Connect SDK

7.3 Flag

Functions to set and get the flag state:

Function	Description
GetFlag	Get the state of the flag
SetFlag	Set the state of the flag

Parameters:

GetFlag:

- imager index (unsigned short)

SetFlag:

- imager index (unsigned short)
- Set flag state (bool):
 - true = close flag, false = open flag

Return value:

- Flag state (bool):
 - true = flag is closed, false = flag is open

Renew the flag (complete flag cycle):

Function	Description
RenewFlag	Renew the flag

Parameters:

- imager index (unsigned short)

Return value:

- Success (bool):
 - true = flag is renewed
 - false = flag could not be renewed (possible reason: flag is controlled by PIF)

7.4 Optics

Functions to handle the optics:

Function	Description
GetOpticsCount	Get the number of existing optics
GetOpticsIndex	Get the index of the used optics (starts with 0)
SetOpticsIndex	Set the index of the used optics
GetOpticsFOV	Get the used field of view of the optics

First call `GetOpticsCount` to retrieve the count of existing optics:

Parameters:

- imager index (unsigned short)

Return value:

- count of existing optics (unsigned short)

Call `GetOpticsIndex` to get the optics that is in use:

Parameters:

- imager index (unsigned short)

Return value:

- optics index (unsigned short)

Connect SDK

Call `SetOpticsIndex` to set the optics you want to use:

- Parameters:**
- imager index (unsigned short)
 - optics index (unsigned short)
- Return value:**
- optics index (unsigned short)

Call `GetOpticsFOV` to get the field of view of the optics with the given index:

- Parameters:**
- imager index (unsigned short)
 - optics index (unsigned long)
- Return value:**
- angle in ° (unsigned short)

Connect SDK

7.5 Temperature Ranges

Functions to handle the temperature ranges:

Function	Description
<code>GetTempRangeCount</code>	Get the number of existing temp. ranges
<code>GetTempRangeIndex</code>	Get the index of the used temp. range (starts with 0)
<code>SetTempRangeIndex</code>	Set the index of the used temp. range
<code>GetTempMinRange</code>	Get the min temperature of the used temp. range
<code>GetTempMaxRange</code>	Get the max temperature of the used temp. range

First call `GetTempRangeCount` to retrieve the count of existing temperature ranges:

- Parameters:** - **imager index (unsigned short)**
Return value: - count of existing temperature range (unsigned short)

Call `GetTempRangeIndex` to get the temperature range that is in use:

- Parameters:** - **imager index (unsigned short)**
Return value: - temperature range index (unsigned short)

Call `SetTempRangeIndex` to set the temperature range you want to use:

- Parameters:** - **imager index (unsigned short)**
- **temperature range index (unsigned short)**
Return value: - temperature range index (unsigned short)

Call `GetTempMinRange` and `GetTempMaxRange` to get the lower and upper limit of the temperature range with the given index:

- Parameters:** - **imager index (unsigned short)**
- **temperature range index (unsigned long)**
Return value: - temperature in °C (float)

Functions to handle the extended temperature range mode:

Function	Description
<code>GetExtTempRangeMode</code>	Get the extended temperature range mode
<code>SetExtTempRangeMode</code>	Set the extended temperature range mode

The temperature range mode is an unsigned short value that is defined as:
0 = Disabled, 1 = Enabled without temperatures, 2 = Enabled with temperatures

Call `GetExtTempRangeMode` to get the temperature range mode:

- Parameters:** - **imager index (unsigned short)**
Return value: - temperature range mode (unsigned short)

Connect SDK

Call `SetExtTempRangeMode` to set the temperature range mode:

- Parameters:**
- imager index (unsigned short)
 - temperature range mode (unsigned short)
- Return value:**
- temperature range mode (unsigned short)

7.6 VideoFormats

Functions to handle the video formats:

Function	Description
<code>GetVideoFormatCount</code>	Get the number of existing video formats
<code>GetVideoFormatIndex</code>	Get the index of the used video format (starts with 0)
<code>SetVideoFormatIndex</code>	Set the index of the used video format
<code>GetVideoFormat</code>	Get the video format with the given index
<code>GetSourceResolutionIR</code>	Get the current origin resolution of the imager
<code>GetClippedFormatMaxPos</code>	Get the max. position of the imager's sub frame mode
<code>GetClippedFormatPos</code>	Get the position of the imager's sub frame mode
<code>SetClippedFormatPos</code>	Set the position of the imager's sub frame mode

First call `GetVideoFormatCount` to retrieve the count of existing video formats depending from the connected camera:

- Parameters:**
- imager index (unsigned short)
- Return value:**
- count of existing video formats (unsigned short)

Call `GetVideoFormatIndex` to get the video format that is enabled:

- Parameters:**
- imager index (unsigned short)
- Return value:**
- video format index (unsigned short)

Call `SetVideoFormatIndex` to set the video format that should be enabled:

- Parameters:**
- imager index (unsigned short)
 - video format index (unsigned short)
- Return value:**
- video format index (unsigned short)

Call `GetVideoFormat` to get the video format with the given index:

- Parameters:**
- imager index (unsigned short)
 - video format index (unsigned long)
 - Pointer to a video format structure (`VideoFormat*`) that returns the video format
- Return value:**
- Error/Success code (`HRESULT`)

Connect SDK

Call `GetSourceResolutionIR` to get the origin IR resolution of the current video index:

- Parameters:**
- imager index (unsigned short)
 - Pointer to a size struct that returns the resolution
- Return value:**
- Error/Success code (HRESULT)

Call `GetClippedFormatMaxPos` to get the imager's clipped format maximum position:

- Parameters:**
- imager index (unsigned short)
 - Location of the clip (POINT*)
- Return value:**
- Error/Success code (HRESULT)

Call `GetClippedFormatPos` to get the imager's clipped format position:

- Parameters:**
- imager index (unsigned short)
 - Location of the clip (POINT*)
- Return value:**
- Error/Success code (HRESULT)

Call `SetClippedFormatPos` to set the imager's clipped format position:

- Parameters:**
- imager index (unsigned short)
 - Location of the clip (POINT)
- Return value:**
- Error/Success code (HRESULT)

7.7 Measuring settings

Functions to get and set measuring settings:

Function	Description
GetFixedEmissivity	Gets the fixed value for emissivity
SetFixedEmissivity	Sets the fixed value for emissivity
GetFixedTransmissivity	Gets the fixed value for transmissivity
SetFixedTransmissivity	Sets the fixed value for transmissivity
GetFixedTempAmbient	Gets the fixed value for ambient temperature
SetFixedTempAmbient	Sets the fixed value for ambient temperature
GetFixedTempReference	Gets the fixed value for reference temperaturePIF
SetFixedTempReference	Sets the fixed value for reference temperature

Parameters:

Get-Functions:

- imager index (unsigned short)

Set-Functions:

- imager index (unsigned short)
- Set value (float)
 - for emissivity and transmissivity 0.1 ... 1.1
 - for TAmbient temperature in °C

Return value:

- Value (float)
- for emissivity and transmissivity 0.1 ... 1.1
- for TAmbient temperature in °C

7.8 Alarm settings

Functions to get and set alarm settings:

Function	Description
GetAlarmThreshold	Gets the threshold and other alarm settings for a measure area
SetAlarmThreshold	Sets the threshold and other alarm settings for a measure area

Parameters:

- imager index (unsigned short)

GetAlarmThreshold:

- type of measure area (MeasureAreaType)
- measure area index (unsigned long)
- Pointer to alarm settings (AlarmSetting*)

SetAlarmThreshold:

- Alarm settings (AlarmSetting)

7.9 Process Interface (PIF) settings

These function can be used to set the output pins and get input-state of the PIF:

Function	Description
GetPifAICount	Get the number of analog inputs (unsigned short)
GetPifDICount	Get the number of digital inputs (unsigned short)
GetPifAOCCount	Get the number of analog outputs (unsigned short)
GetPifDOCount	Get the number of digital outputs (unsigned short)
GetPifFSCount	Get the number of failsafe (unsigned short)
SetPifAO	Set analog out, returns AO value (float)
SetPifDO	Set digital out, returns DO value (boolean)
GetPifAI	Get pif analog in (float)
GetPifDI	Get pif digital in (unsigned long)
GetPifType	Get type of pif (unsigned short)
SetPifOut	Same as SetPifAO

Parameters:

- imager index (unsigned short)
- PifChn: IO channel (unsigned short), allowed values 0 ... n
- value (float), allowed values 0.0 ... 10.0
- value(bool)

Return value:

- GetPifType(unsigned short)
0...None, 1...Standard PIF, 2...Industrial PIF, 3...Intern (Xi), 4....stackable PIF, 4095...undefined, 65535 ...error

Other PIF functions:

Function	Description
GetPIFType (≥PIC 2) GetPIFVersion (≥PIXC 3)	Get version of process interface

Parameters:

- imager index (unsigned short)

Return value:

- version (unsigned short)

Function	Description
GetPIFSerialNumber	Get serial number of process interface

Parameters:

- imager index (unsigned short)

Return value:

- serial number (unsigned long)

Function	Description
GetPIFDeviceCount	Get the number of process interface devices

Parameters:

- imager index (unsigned short)

Return value:

- number of PIF devices (unsigned char)

Connect SDK

7.10 Focus control

The following functions can be used to control the focus of the Xi imager series.

Function	Description
GetFocusmotorMinPos	Get the minimum position of focus motor (unsigned short)
GetFocusmotorMaxPos	Get the maximum position of focus motor (unsigned short)
GetFocusmotorPos	Get the actual position of focus motor (unsigned short)
SetFocusmotorPos	Set the position of focus motor, returns motor position

Parameters: - imager index (unsigned short)

7.11 Getting version information

These functions retrieve the versions of the corresponding executable files:

Function	Description
GetVersionApplication	Version of PIX Connect
GetVersionHID_DLL	Version of the SteuerHID.dll
GetVersionCD_DLL	Version of the ControlDevice.dll
GetVersionIPC_DLL	Version of the ImagerIPC2.dll

Parameters: - imager index (unsigned short)

Return value: - version (__int64): four 16 bit values (words):
Major-Version, Minor-Version, Build, Revision

7.12 Application appearance

With the following functions the connected application can control the appearance of PIX connect. By switching it to the “Embedded State” and moving and resizing it in an intelligent way the PIX Connect video window can look like as it belongs to the connected application.

If the “Embedded state” is set the video window can be embedded into any application. The user sees just the video window, no tool windows, no tool bars, and no frames. The window is always on top.

Functions to set and get the embedded state.

Function	Description
GetMainWindowEmbedded	Get the main window embedded state
SetMainWindowEmbedded	Set the main window embedded state

Parameters: GetMainWindowEmbedded:
- imager index (unsigned short)

SetMainWindowEmbedded:
- imager index (unsigned short)
- set state (bool)

Return value: - embedded state (bool)

Connect SDK

Functions to set and get the application location:

Function	Description
GetMainWindowLocX	Get the main window left coordinate
SetMainWindowLocX	Set the main window left coordinate
GetMainWindowLocY	Get the main window top coordinate
SetMainWindowLocY	Set the main window top coordinate
GetMainWindowWidth	Get the main window width
SetMainWindowWidth	Set the main window width
GetMainWindowHeight	Get the main window height
SetMainWindowHeight	Set the main window height

First call `GetOpticsCount` to retrieve the count of existing optics:

Parameters:

- Get-Functions:
 - imager index (unsigned short)
- Set-Functions:
 - imager index (unsigned short)
 - coordinate (unsigned short)

Return value:

- Coordinate (unsigned short)

7.13 File management

There are a number of commands to start and stop recording and playing, and to take and reopen snapshots:

`FileOpen`-function:

Function	Description
FileOpen	Opens a file with radiometric data. This can be ravi-, tiff- or a jpeg-file.

Parameters:

- imager index (unsigned short)
- file name (wchar_t*)

Return value:

- Error / Success code (HRESULT).

Note: Opening files with an included layout that use no inter-process communication will cause the current connection to be interrupted. It is recommended to answer the question to load the layout with "No" and mark the checkbox "Don't ask me again".

Connect SDK

Other file management functions:

Function	Description
FileSnapshot	Takes a snapshot. The file name is automatically set according to the template of the triggered recording. If the snapshot is stored the application will be notified by a <code>OnFileCommandReady</code> -event.
FileScreenshot	Takes a screenshot. The file name is automatically set according to the template of the triggered recording. If the snapshot is stored the application will be notified by a <code>OnFileCommandReady</code> -event.
FileRecord	Starts recording. The file name is automatically set according to the template of the triggered recording.
FileStop	Stops recording, playing and viewing a snapshot. If an imager is connected it will return to live view. After stop recording: If the ravi file is stored the application will be notified by a <code>OnFileCommandReady</code> -event.
FilePause	Pauses a ravi file that is currently playing.
FilePlay	Plays a ravi file that is currently paused.

- Parameters:**
- imager index (unsigned short)
- Return value:**
- Error / Success code (HRESULT).

Recording start time:

Function	Description
GetRecordingStartTime	Start time of the recorded file. This function returns a valid value in Recording mode and Playing mode only. According to the .NET documentation of <code>DateTime</code> ticks: This value represents the number of 100-nanosecond intervals that have elapsed since 12:00:00 midnight, January 1, 0001 in the Gregorian calendar

- Parameters:**
- imager index (unsigned short)
- Return value:**
- Start time (int64 / long long).

Connect SDK

7.14 Layout management

With the following command loading/saving layouts can be handled

LoadLayout-function:

Function	Description
LoadLayout	Loads the layout with the name, returns HRESULT
LoadCurrentLayout	Load the current layout for imager, returns void
SaveCurrentLayout	Save the current layout for imager, returns void
SetStandardLayout	Load standard layout for imager, returns void

- Parameters:**
- Imager index (unsigned short)
 - Layout name (wchar_t *)
- Return value:**
- Error / Success code (HRESULT)
 - Void

The layout name must not contain the extension xml and the directory of the layout. The layout will be searched in the MeasuringLayout directory of the configuration path.

Note: Opening a layout that uses no inter-process communication will cause the current connection to be interrupted.

Connect SDK

7.15 Other commands

Function	Description
GetSerialNumber	Get the serial number of the imager
GetPIFSerialNumber	Get serial number of process interface

Parameters: - imager index (unsigned short)
Return value: - serial number (unsigned long)

Function	Description
CloseApplication	Closing PIX Connect

Parameters: - imager index (unsigned short)
Return value: - (void)

Function	Description
ReinitDevice	Reinitialize the communication between device and PIX connect

Parameters: - imager index (unsigned short)
Return value: - (void)

Function	Description
GetInitCounter	Get the "Initialization Counter"

Parameters: - imager index (unsigned short)
Return value: - initialization counter (unsigned short):
 Estimated time in msec. until the application will be initialized. Can be used to control a progress bar.

Function	Description
GetAvgTimePerFrame	Get the average time for a frame
GetVisisbleAvgTimePerFrame	Get the average time for a visible frame

Parameters: - imager index (unsigned short)
Return value: - average time per frame in [100 ns]

Function	Description
GetHardwareRev	Get the hardware revision
GetFirmwareRev	Get the firmware revision

Parameters: - imager index (unsigned short)
Return value: - revision (unsigned short)

Connect SDK

Function	Description
GetPID	Get the USB product ID
GetVID	Get the USB vendor ID

Parameters: - imager index (unsigned short)

Return value: - ID (unsigned short)

8 Appendix

8.1 Roadmap for an application that uses the ImagerIPC2.dll

This is a short step-by-step operational list for implementing an application that uses the ImagerIPC2.dll in callback or polling operation:

Callback operation:

- Set the number of imagers (respectively instances of optris PIX Connect) by calling the `SetImagerIPCCount`-function. When using more than one imager the following steps must be done for any imager.
- Call (repeatedly) the `InitImagerIPC`- or the `InitNamedImagerIPC`-function and check if the return value signals success.
- Call all `SetCallback` functions with the appropriate function pointers.
- Call the `RunImagerIPC`-function and check if the return value signals success.
- Wait for the `OnInitCompleted` event. After the event occurred you are allowed to call all get- and set-functions.
- Call get functions to retrieve configuration data you need from the imager.exe.
- Wait for the `OnFrameInit` event. If the event was occurred create all objects you need to process the data from the video frames.
- Process all `OnNewFrame` events. Enable sending further frames either by returning zero in the `OnNewFrame` callback function or by returning a value less than zero and using the `AcknowledgeFrame` function.
- Call all get functions that retrieves temperature values you need repeatedly.
- ...
- If an `OnConfigChanged` event occurs read all configuration data again.
- ...
- If an `OnServerStopped` event occurs, release all your objects and call the `ReleaseImagerIPC` function. Then reinitialize the IPC.
- ...
- ...
- Call the `ReleaseImagerIPC` function before closing your application.

Connect SDK

Polling operation:

- Set the number of imagers (respectively instances of optris PIX Connect) by calling the `SetImagerIPCCount`-function. When using more than one imager the following steps must be done for any imager.
- Call (repeatedly) the `InitImagerIPC`- or the `InitNamedImagerIPC`-function and check if the return value signals success.
- Call the `RunImagerIPC`-function and check if the return value signals success.
- Wait until the `IPC_EVENT_INIT_COMPLETED` bit is set in the return value of the `GetIPCState` call. After the event occurred you are allowed to call all get- and set-functions.
- Call get functions to retrieve configuration data you need from the imager.exe.
- Wait until the `IPC_EVENT_FRAME_INIT` bit is set in the return value of the `GetIPCState` call. If the event was occurred create all objects you need to process the data from the video frames.
- Call repeatedly the `GetFrame` function to retrieve new frames.
- Call all get functions that retrieves temperature values you need repeatedly.
- ...
- If an `OnConfigChanged` event occurs read all configuration data again.
- ...
- If an `OnServerStopped` event occurs, release all your objects and call the `ReleaseImagerIPC` function. Then reinitialize the IPC.
- ...
- ...
- Call the `ReleaseImagerIPC` function before closing your application.

8.2 Data type definition for this document

Data type	Description
char	8 bit signed integer
short	16 bit signed integer
int	32 bit signed integer
long	32 bit signed integer
__int64	64 bit signed integer
unsigned short	16 bit unsigned integer
unsigned long	32 bit unsigned integer
wchar_t	16 bit (wide character)
HRESULT	32 bit signed integer
Float	32 bit single precision floating point, IEEE 754
POINT	struct {long x; long y;}
FCOORD	struct {float x; float y;}
FRANGE	struct {float Min; float Max;}

FrameMetadata structure:

Data type	Description
unsigned short Size	Size of this structure
unsigned int Counter	Frame counter
unsigned int CounterHW	Hardware frame counter
long long Timestamp	Time stamp in 1/100000000-sec. units
long long TimestampMedia	reserved
TFlagState FlagState	Flag state , TFlagState is an enum type with the values: fsFlagOpen, fsFlagClose, fsFlagOpening, fsFlagClosing, fsError
float TempChip	Chip temperature
float TempFlag	Flag temperature
float TempBox	Box temperature
WORD PIFin[2]	Value of analog and digital PIFin <ul style="list-style-type: none"> - DI = Bit15 of PIFin[0] - AI1 = Bit9 ... Bit0 of PIFin[0] (0 = 0V, 1000 = 10V) - AI2 = Bit9 ... Bit0 of PIFin[1] (0 = 0V, 1000 = 10V)

FrameMetadata2 structure:

Data type	Description
unsigned short Size	Size of this structure
unsigned int Counter	Frame counter
unsigned int CounterHW	Hardware frame counter
long long Timestamp	Time stamp in 1/100000000-sec. units
long long TimestampMedia	reserved
BOOL IsSameFrame	Indicates if frame is a duplicate of previous frame
TFlagState FlagState	TFlagState is an enum type with the values: fsFlagOpen, fsFlagClose, fsFlagOpening, fsFlagClosing, fsError
float TempChip	Chip temperature
float TempFlag	Flag temperature
float TempBox	Box temperature
float TempOptics	Temperature of optics
Unsigned short LensPosition	Position of focus motor

Connect SDK

FCOORD HotSpot	Position of fast hot spot
FCOORD ColdSpot	Position of fast cold spot
WORD PIFnDI	Number of digital inputs
DWORD PIFDI	Bitmask for digital inputs, Bit[0...31] == DI[0...31]
WORD PIFnAI	Number of analog inputs
WORD PIFAI[n]	Flexible array of analog input values, PIFAI[i] → [0 ...1000] (0V...1000V)

VideoFormat structure:

Data type	Description
int WidthIR	Frame width of IR channel
int HeightIR	Frame height of IR channel
int FramerateIR	Frame rate of IR channel
int WidthVisible	Frame width of visible channel
int HeightVisible	Frame height of visible channel
int FramerateVisible	Frame rate of visible channel

IR arranging structure:

Data type	Description
TRotationMode Rotation	Rotation mode, TRotationMode is an enum type with the values: rmOff = image rotation off rmCW90 = clockwise 90 degrees rmACW90 = anti-clockwise 90 degrees rmCW180 = clockwise 180 degrees rmCWH = clockwise horizontal diagonal rmCWV = clockwise vertical diagonal rmACWH = anti-clockwise horizontal diagonal rmACWV = anti-clockwise vertical diagonal rmUser = user defined
float RotationAngle	Angle of rotation if Rotation is rmUser
BOOL Zoom	True if zoom is enabled
RECT ZoomRect	The zoom rectangle

Measure area structure:

Data type	Description
MeasureAreaShape Shape	Area shape, MeasureAreaShape is an enum type with the values: masOff= shape is off masMP1x1 = area of 1x1 pixel masMP2x2 = area of 2x2 pixel masMP3x3 = area of 3x3 pixel masMP5x5 = area of 5x5 pixel masUserDefRect = user defined rectangle masEllipse = user defined ellipse masPolygon = user defined polygon masCurve = user defined spline polygon
MeasureAreaMode Mode	Area mode, MeasureAreaMode is an enum type with the values:

Connect SDK

	mamMin = minimum value of area mamMax = maximum value of area mamAvg = average value of area mamDist = percentage of pixels within temp range (min, max)
BOOL BindToTemperatureProfile	Bind measure area to temperature profile.
BOOL UseEmissivity	Use alternative emissivity for the measure area
float Emissivity	Alternative emissivity [0.0 ... 1.0]
BOOL ShowInDigDispGroup	Show in digital display group
float distMin, distMax	Minimum and maximum temperature value for MeasureAreaMode::mamDist
POINT Location	Central location of measure area in pixel
SIZE Size	Size of the measure area. Only used for masUserDefRect and masEllipse
BOOL IsHotSpot, IsColdSpot	Indicates if measure area is coldspot/hotspot

AlarmSetting structure:

Data type	Description
USHORT Index	Index of the measure area
MeasureAreaType Type	The type of the measure area
FRANGE AlarmRange	Range (Low and high) for the alarm
FRANGE PreAlarmRange	Range (Low and high) for the pre-alarm
FRANGE DispRange	Display range (Low and high)
bool DisplayWarning	Display pre alarms in "Digital display group"

Measure area type enumeration (MeasureAreaType):

This enumeration is used in function GetAlarmThreshold

Value	Description
Undefined (0)	Type is unknown
Measure area (1)	Alarm refers to a measure area
Calculated object (2)	Alarm refers to a calculated object
Mouse cursor (3)	Alarm refers to the mouse cursor
Chip temperature (4)	Alarm refers to the temperature of the bolometer chip
Internal temperature (5)	Alarm refers to the imagers internal temperature
Reference temperature (6)	Alarm refers to the reference temperature