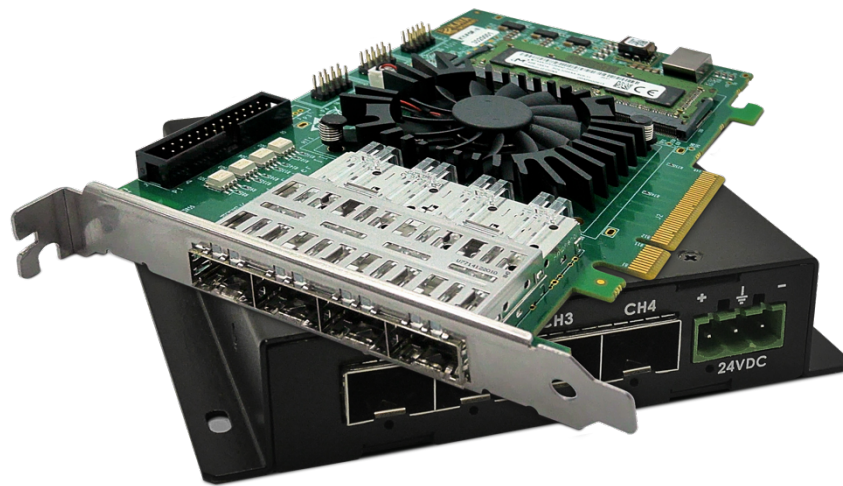


FXP II Acquisition system

Hardware Reference & Installation Guide

February 2025

Rev 1.1



International Distributor

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1 Revision history

Version	Date	Notes
1.0	05/24	Initial Release
1.1	02/2025	Added Cooling requirements section

Table 1 – Revision History

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4 Introduction

4.1 Safety precautions

With your **FXP II Acquisition system** components in hand, please take the time to read through the precautions listed below to prevent preventable and unnecessary injuries and damage to you, other personnel, or property. Read these safety instructions carefully before your first use of the product, as these precautions contain safety instructions that must be observed. Be sure to follow this manual to prevent misuse of the product.

 Caution! Read Carefully and do not disregard these instructions.
In the event of a failure, disconnect the power supply. Disconnect the power supply immediately and contact our sales personnel for repair. Continuing to use the product in this state may result in a fire or electric shock.
If an unpleasant smell or smoking occurs, disconnect the power supply. Disconnect the power supply immediately! Continuing to use the product in this state may result in a fire or electric shock. After verifying that no smoking is observed, contact our sales personnel for repair.
Do not disassemble, repair or modify the product. This may result in a fire or electric shock due to a circuit shortage or heat generation. Contact our sales personnel before inspection, modification, or repair.
Do not place the product on unstable surfaces. Otherwise, it may drop or fall, resulting in injury to persons or the camera.
Do not use the product if dropped or damaged. Otherwise, a fire or electric shock may occur.
Do not touch the product with metallic objects. Otherwise, a fire or electric shock may occur.
Do not place the product in dusty or humid environments, nor where water may splash. Otherwise, a fire or electric shock may occur.
Do not wet the product or touch it with wet hands. Otherwise, the product may fail or it may cause a fire, smoking, or electric shock.
Do not touch the gold-plated sections of the connectors on the product. Otherwise, the surface of the connector may be contaminated by sweat or skin oil, resulting in contact failure of a connector, malfunction, fire or electric shock due to static electricity discharge.
Do not use or place the product in the following locations. ▪ Unventilated areas such as closets or bookshelves. ▪ Near oils, smoke or steam. ▪ Next to heat sources. ▪ A closed (and not running) car where the temperature becomes high. ▪ Static electricity replete locations ▪ Near water or chemicals. Otherwise, a fire, electric shock, accident or deformation may occur due to a short circuit or heat generation.
Do not place heavy objects on the product. Otherwise, the product may be damaged.
Do not look into the fiber optic cable or the panel mounted SFP+ connectors. In order to avoid possible exposure to (Class 1) laser energy.
Be sure to discharge static electricity from the body before touching any sensitive electronic components. The electronic circuits in your computer and the circuits on the <i>KY-FXP-II</i> device are sensitive to static electricity and surges. Improper handling may seriously damage the circuits. In addition, do not let your clothing come in contact with the circuit boards or components. Otherwise, the product may be damaged.

4.2 Disclaimer

KAYA Instruments will assume no responsibility for any damage that may ensue by the use of this product for any purpose other than intended, as previously stated. Without detracting from what was previously written, please be advised that the company will take no responsibility for any damages caused by:

- Earthquake, thunderstrike, natural disasters, a fire caused by use beyond our control, willful and/or accidental misuse and/or use under other abnormal and/or unreasonable conditions.
- Secondary damages caused by the use of this product or its unusable state (business interruption or others).
- Use of this product in any manner that contradicts this manual or malfunctions that may occur due to connection to other devices. Damage to this product that is out of our control or failure due to modification.
- Accidents and/or third parties that may be involved.

Additionally, **KAYA Instruments** assumes no responsibility or liability for:

- Erasure or corruption of data caused by the use of this product.
- Any consequences or other abnormalities following the use of this product.

Repairs to this product are carried out by replacing it on a chargeable basis and not by repairing the faulty device. Non-chargeable replacement is offered for the initial failure, as long as it is reported no later than two weeks post-delivery of the product.

5 Key Features

5.1 Overview

FXP II Acquisition system is the industry first CoaXPress image acquisition system without range limitations. The system uses fiber optic cables to provide high resolution image acquisition interface for distances up to 80 km in single-mode and up to 300 m in multi-mode. **The FXP II Acquisition system** is capable of receiving video streams from up to 4 CoaXPress links in single, dual or quad modes. It is used for simultaneous capture from up to four cameras. Each link supports standard CoaXPress bitrates up to 12.5 Gbps. This system is ideally suited for industrial, defense and aerospace Machine Vision Systems and applications.

The system consists of Komodo II CoaXPress over Fiber Frame Grabber and KY-FEXT-II-D remote unit. The remote unit converts CoaXPress links to standard CoF interface. **The FXP II Acquisition system** uses a high performance flow through DMA to transmit video streams to computer memory through PCIe interface with minimal latency. This product also provides GPIO for machine control signals, such as triggers, shaft encoders, exposure control and general I/O, which can be control aside video stream acquisition.

The Frame Grabber utilizes PCIe Gen3 x8 links for communication with Host PC for video uploading and configuration.

6 System Description

6.1 System structure

The **FXP II Acquisition system** consists of a CoaXPress extender unit (KY-FEXT-II-D) that translates the CoaXPress interface to fiber optic interface and a Komodo II CoaXPress over Fiber frame grabber that is able to acquire video directly from fiber optic cables.

The Komodo II CoaXPress over Fiber Frame Grabber supports multiple modes of configuration and system topology. Few of these are presented in following diagrams.

Single Extender – Single Camera Topology:

One Single, Dual or Quad CoaXPress links with up to 12.5 Gbps per link topology.

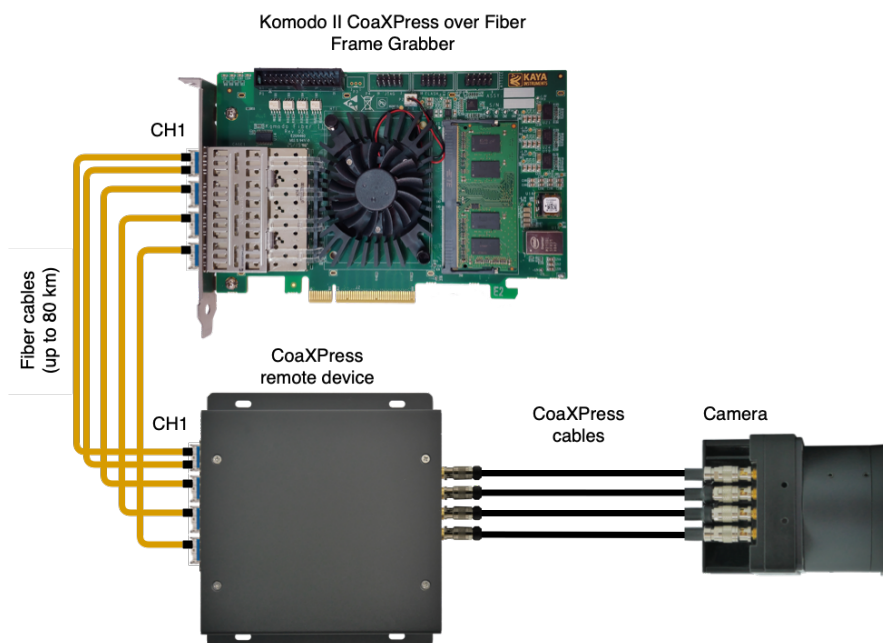


Figure 1 – Single FEXT – Single camera topology diagram

Single Extender – Dual Camera Topology:

Two Single or Dual CoaXPress links with up to 12.5 Gbps per link topology.

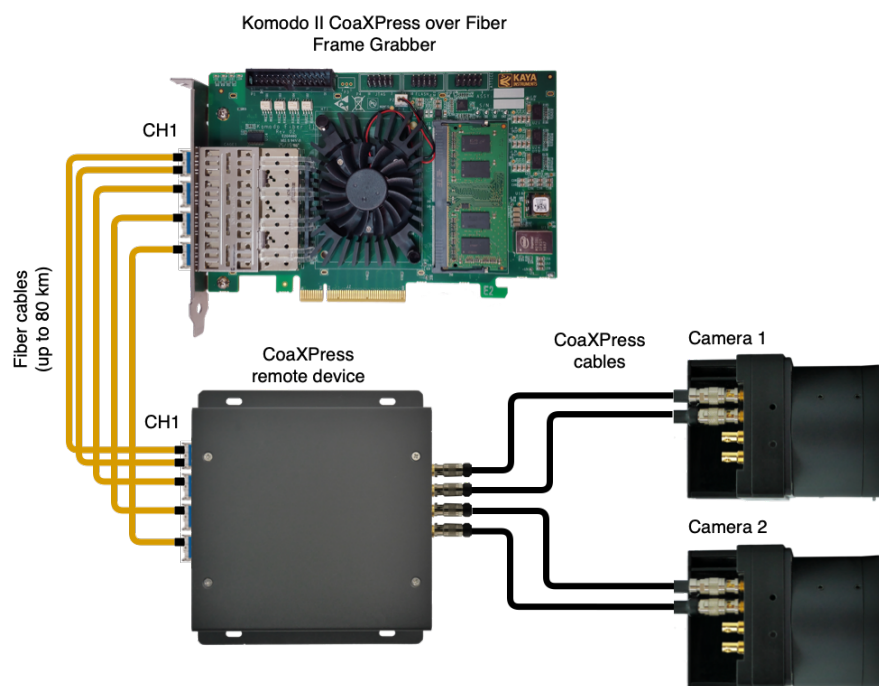


Figure 2 – Single FEXT – Dual camera topology diagram

Single Extender – Quad Camera Topology:

Four Single CoaXPress links with up to 12.5 Gbps per link topology.

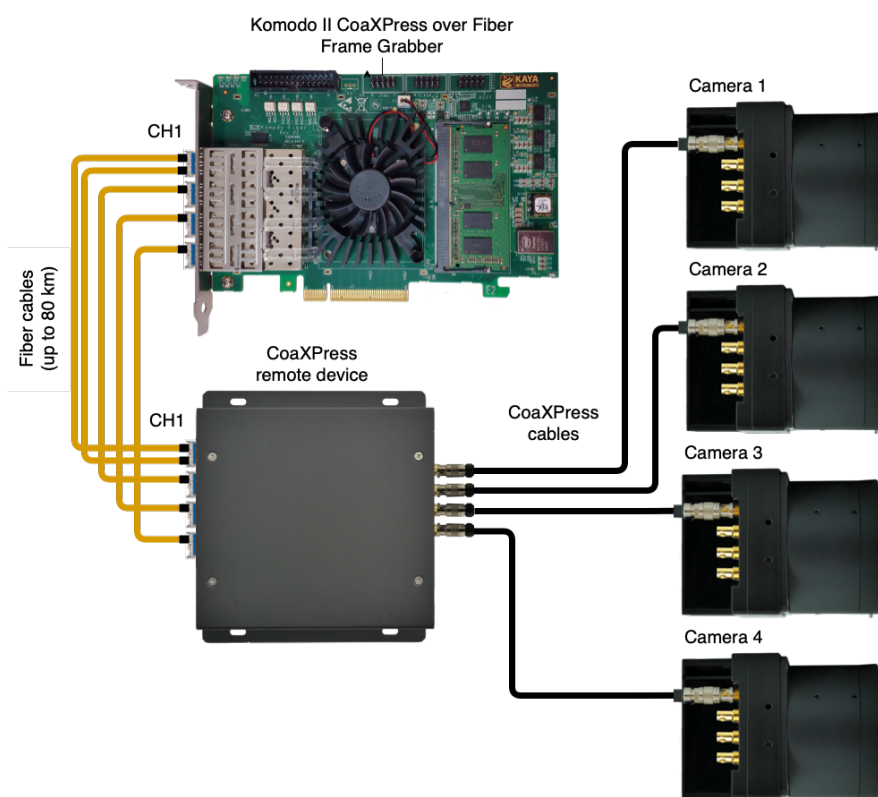


Figure 3 – Single FEXT – Quad camera topology diagram

7 Installation and Configuration

7.1 Installation procedure

The typical **FXP II Acquisition system** is connected as described in Figure 4:

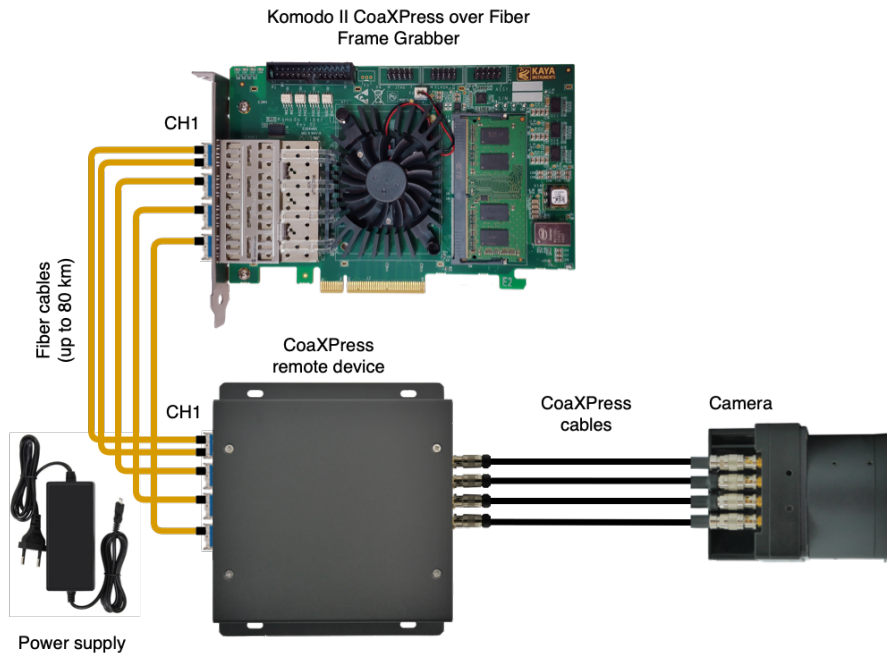


Figure 4 – FXP II Acquisition system connection diagram

The first stage of the system installation is Komodo II CoaXPress over Fiber Frame Grabber board installation as described in section 7.3.1. The second stage is installation of the SFP+ modules and fiber cable allowing the connection between the CoaXPress Extender Device (KY-FEXT-II-D) and the Komodo II CoaXPress over Fiber Frame Grabber, described in section 7.3.4. The third stage is connection of KY-FEXT-II-D unit and CoaXPress camera as described in section 7.4.

7.2 Cooling requirements

The Range Extender, in its standard configuration, does not include a heatsink or fan. Users must ensure sufficient airflow or implement an appropriate heat dissipation method to prevent overheating. Mounting the device without adequate cooling may reduce the lifespan of internal components and affect performance.

7.3 Power Supply

This device requires 24 V power supply for proper function. The Host side of the extender is compatible with PoCXP standard and therefore doesn't require external power supply, once the Frame Grabber supports this feature too.

At the Device side, external power supply must be used. Please, refer to Electrical specification section of this document for exact Power Supply requirements. An optional power supply or user selectable must be connected to this on the device side extender box.

Connect the positive wire from the power supply to the "+" connector, connect the GND pin of connector to the ground wire and the negative wire to the "-" connector, as seen in Figure 5.

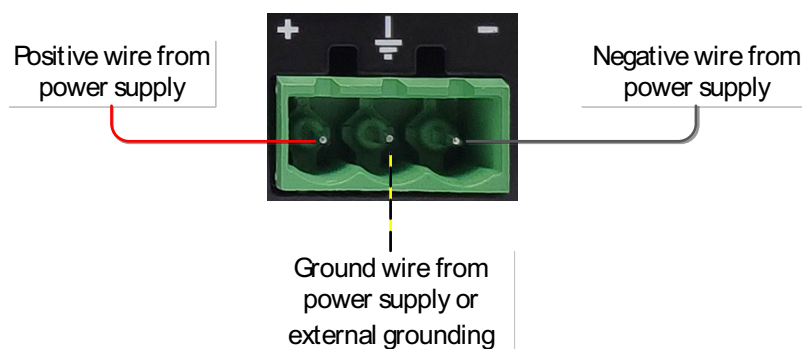


Figure 5 – KY-FEXT-II-D power connector

Table 2 includes part numbers for both female and male connector of the power supply:

Connector	Manufacturer	Part Number
Female Connector	Wurth Elektronik	691313510003
Male Connector	Wurth Elektronik	691351500003

Table 2 – Power connectors

7.3.1 Komodo II CoaXPress over Fiber Frame Grabber installation

Before system installation the Komodo II CoaXPress over Fiber Frame Grabber board should be installed into host computer. Komodo II CoaXPress over Fiber board is standard PCIe card with 8 lanes connector.

It can be installed in any PCIe connector of the motherboard with 8 lanes and up.

Note: The Komodo II CoaXPress over Fiber board should be installed before you install your software.

1. Before installing, turn off the power of the computer and its peripherals.
2. Use an ESD-preventive glove, wrist or ankle strap and follow its instructions for use.
3. Make sure there is no dust or any other foreign matter inside the PCIe slot and the Frame Grabbers PCIe connector or blocking any of the connectors.
4. Firmly insert the Komodo II CoaXPress over Fiber board to PCIe connector of the motherboard.
5. Anchor the PCIe bracket to the computer chassis using M3 screw.
6. Verify the Komodo II CoaXPress over Fiber board inserted correctly to the PCIe slot.
7. Power up the computer.
8. After OS is up, you will be asked to install a driver for new Multimedia Device. At this stage, you should cancel the installation.

Under Windows and Linux OS, the compatible drivers for Komodo II CoaXPress over Fiber board will be installed during installation of Vision Point software application.

You can install and use multiple Komodo II CoaXPress over Fiber Frame Grabbers in a single computer.

The number of Komodo II CoaXPress over Fiber boards that can be installed in a computer depends on the number of available PCIe slots.

7.3.2 Installing and Removing SFP+ Modules

The purpose of this section is to demonstrate how to install SFP+ transceiver module, attach an optical network cable and remove an SFP+ transceiver module. It is necessary to understand the correct way of installing and removing an SFP+ transceiver, as correct operation can protect the module from being damaged and ensure its stable performance. Before removing or installing an SFP+ module, please follow the precautions and installation instructions.

7.3.3 Precautions

1. Use an ESD-preventive wrist or ankle strap and follow its instructions for use.
2. Make sure there is no dust or any other foreign matter inside the SFP+ module or blocking any of the connectors.
3. Clean the optic surfaces of the fiber cables before plugging them into the optical ports of an SFP+ module.
4. Removing and inserting a module can shorten its useful life, so you should not remove and insert the module any more often than is absolutely necessary.
5. Insert the clean dust covers into the module after the cables are removed. Do not remove the dust plug until you are ready to attach the network interface cable.
6. Do not install or remove the SFP+ module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module.
7. Disconnect all cables before removing or installing a module.
8. Place the removed module on an antistatic mat or a static shielding bag if you plan to return it to the factory.
9. Protect the line card by inserting clean module cage covers into the optical module cage when there is no module installed.
10. Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver optical bores until you are ready to make a connection.

7.3.4 Installing the SFP+ Module

In order to install the SFP+ module, follow these steps:

1. Remove the dust plugs from the module as shown in Figure 6 (a).
2. The SFP+ module has a bale clasp that used to remove or install the SFP+ module.
3. Close the bale clasp before inserting the SFP+ module.
4. Line up the module with the port and slide it into the port as shown in Figure 6 (b).
5. Make sure that the male connectors on the module will align with the female connectors inside the cage.
6. Verify that the modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each module. In case the module is not completely seated and secured in the receptacle, you will hear a click as the triangular pin on the bottom of the module snaps into the hole in the receptacle.
7. Follow the exact steps to insert additional module into the KY-FEXT-II-D fiber interface.

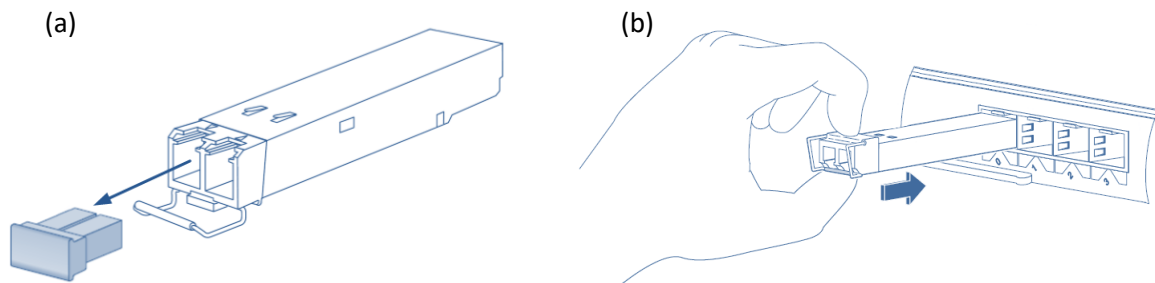


Figure 6 – SFP+ Module Installation.

(a) Cable clasp open and dust plug removed, (b) Installing an SFP+ Module into a port

7.3.5 Connecting the interface Cable to SFP+ Module

In order to properly connect the fiber optic cables, the following steps must be taken:

1. Remove the protective dust plugs from the fiber-optic cable connectors.
2. Perform the connection according to the instructions below:
 - a) Channel 0 of the system must be always connected as controls are delivered with this port.
 - b) A Fiber connection must be done to the same port number all over the way from KY-FEXT-II-D to Komodo II CoaXPress over Fiber Frame Grabber.
 - c) A fiber cable should match an SFP+ type. If a single mode SFP+ is used a single mode fiber should be attached to it. If a multi-mode SFP+ is used a multi-mode fiber should be attached.
 - d) On Fiber channel 0 both the TX and RX fiber cables must be connected. On channels 1 through 3 only one fiber cable should be connected. This cable is connected between TX output (Marked with TX or Arrow outwards the SFP+) on the KY-FXP-II-D and RX input (Marked with RX or Arrow inwards the SFP+) on the Komodo II CoaXPress over Fiber Frame Grabber, as shown in Figure 7 (a).
3. Insert the fiber cable into the module, as shown in Figure 7 (b).
4. Firmly push on each cable, until you will hear a click.
5. Connect the other side of the fiber cable to the KY-FXP-II-D.

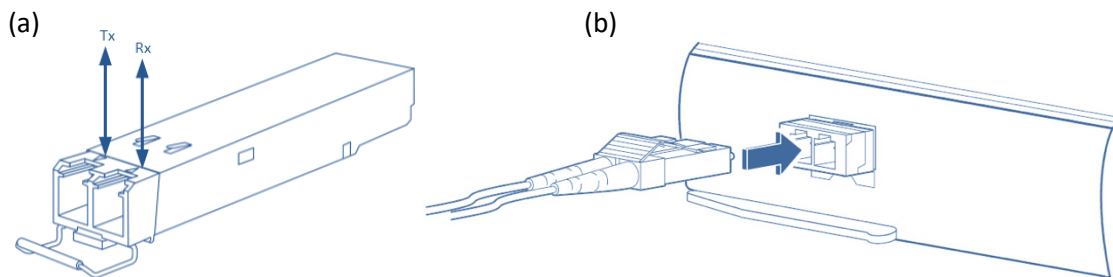


Figure 7 – Interface connecting to the SFP+ Module
(a) SFP+ module with TX output and RX input marked, b) Connecting the cable to SFP+ Module

7.3.6 Removing the SFP+ Module

In order to remove the SFP+ module, follow these steps:

1. Turn the KY-FXP-II-D and the computer off.
2. Disconnect and remove all interface cables from the ports.
3. Open the bale clasp on the SFP+ module with your index finger, or a small flat-blade screwdriver, in a downward direction, as shown in Figure 8 (a).
4. Grasp the module between your thumb and index finger and carefully remove it from the port, as shown in Figure 8 (b).
5. Insert the clean dust covers into the module, as shown in Figure 8 (c).

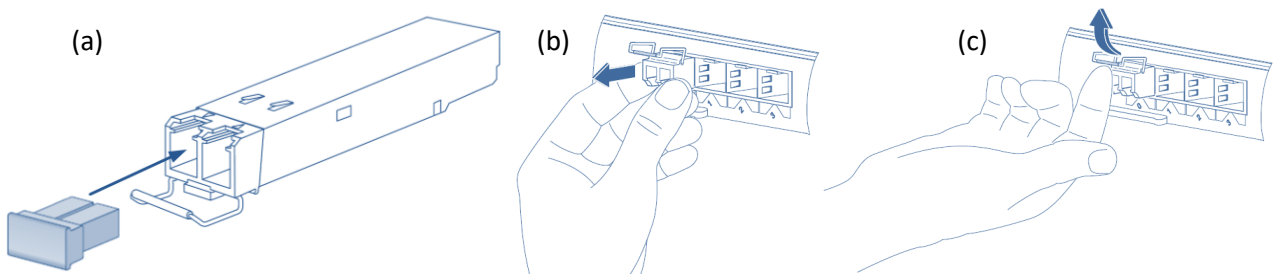


Figure 8 – Removing the SFP+ Module

(a) Opening the bale clasp of an SFP+ Module, (b) Removing an SFP+ Module from the port, (c) SFP+ Module dust plug placement

7.4 Completing the FXP II Acquisition system installation

In order to properly complete the **FXP II Acquisition system** installation, the following steps must be taken for initial power up:

1. Make sure the fiber cable is connected properly, as described in previous section, and using one of the configuration below.
2. Connect the Coax cables between the camera and KY-FEXT-II-D unit in the right order, using one of the configurations available:

7.4.1.1 SFP+ Single connectivity

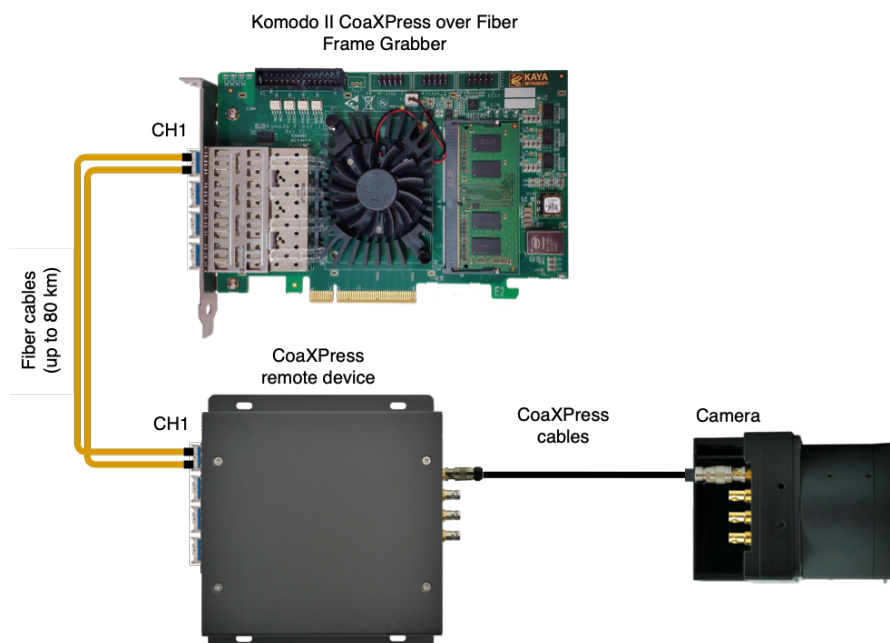


Figure 9 – SFP+ Single connectivity order

7.4.1.2 SFP+ Dual connectivity

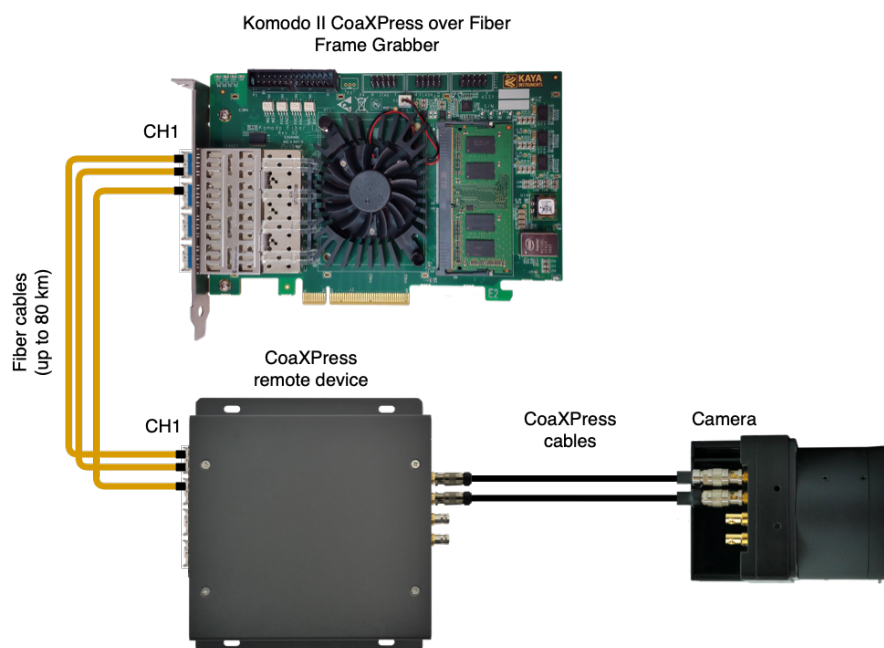


Figure 10 – SFP+ Dual connectivity order

7.4.1.3 SFP+ Quad connectivity

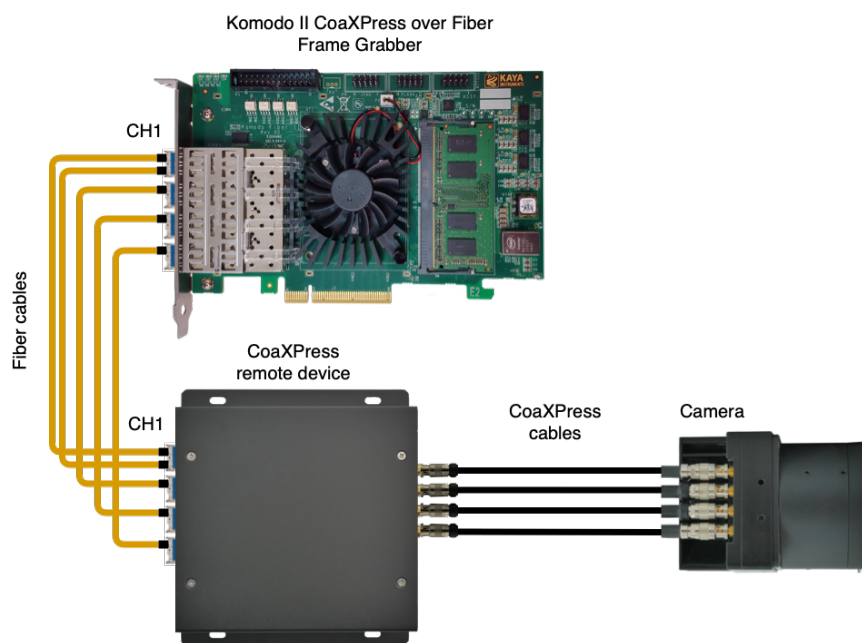


Figure 11 – SFP+ Quad connectivity order

7.5 Reducing the fiber optic cable count

The system requires $N+1$ fiber optical cables in order to properly operate. The N is the number of CoaXPress links required for the camera. But sometimes it required transferring the data over smaller number of cables. Several options listed in the sections below exist in order to reduce the number of required optical cables. Please note that these options are available for single mode fiber infrastructure only. Please contact KAYA representative for details of those options.

7.5.1 CWDM SFP+ option

In CWDM each optical SFP module operates at different wavelength and then an optical multiplexer is used to mix all the signals into a single fiber. In this mode the number of cables required in the infrastructure can be reduced from 5 down to two cables or even single cable. The CWDM also can be used to use the CoaXPress over existing infrastructure, sharing the same fiber cables with other applications.

Two available CWDM modes (for single or dual fibers) are described in Figure 12 and Figure 13. For assignment of CWDM wavelengths please contact KAYA Instruments' representative.

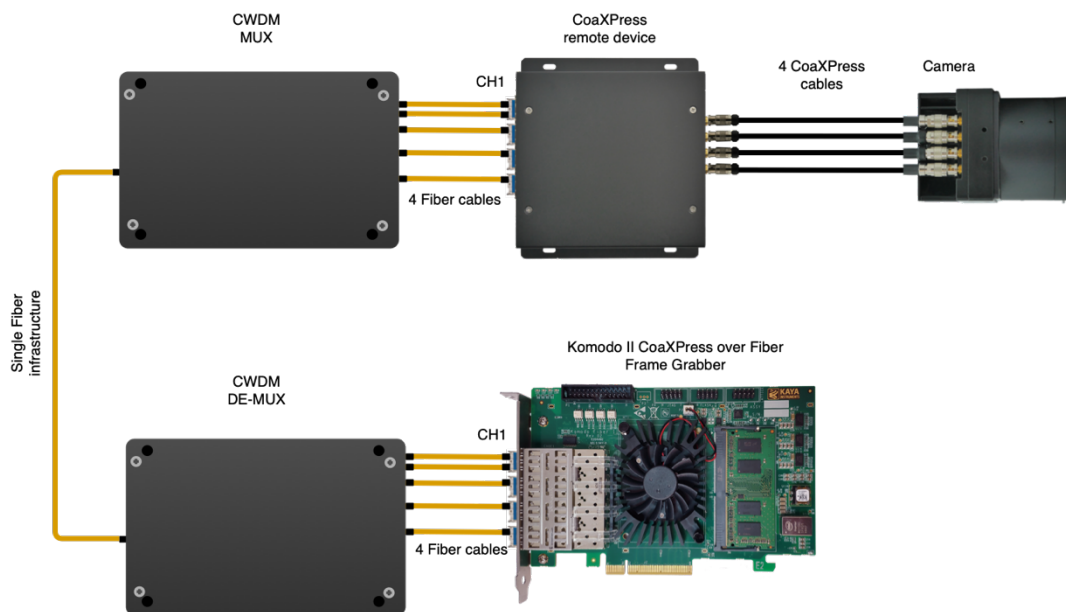


Figure 12 – CWDM mode for single fiber

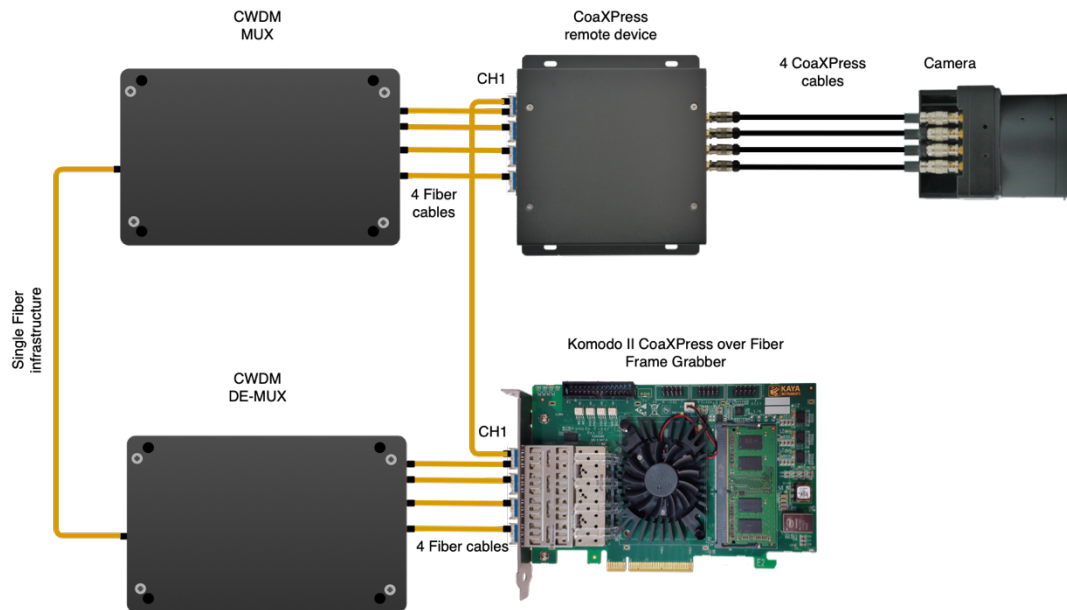


Figure 13 – CWDM mode for dual fiber

7.5.2 Bidirectional (BIDI) SFP+ option

This option allows reducing one fiber optic cable from the system. The total required number of cables will be as number of Coax cables. For example, 4 link cameras will require 4 fiber cables.

In this option the SFP+ in link 1 is replaced by bidirectional (BIDI) SFP that transmits and receives on the same fiber cable. The example connection for four link camera is described below.

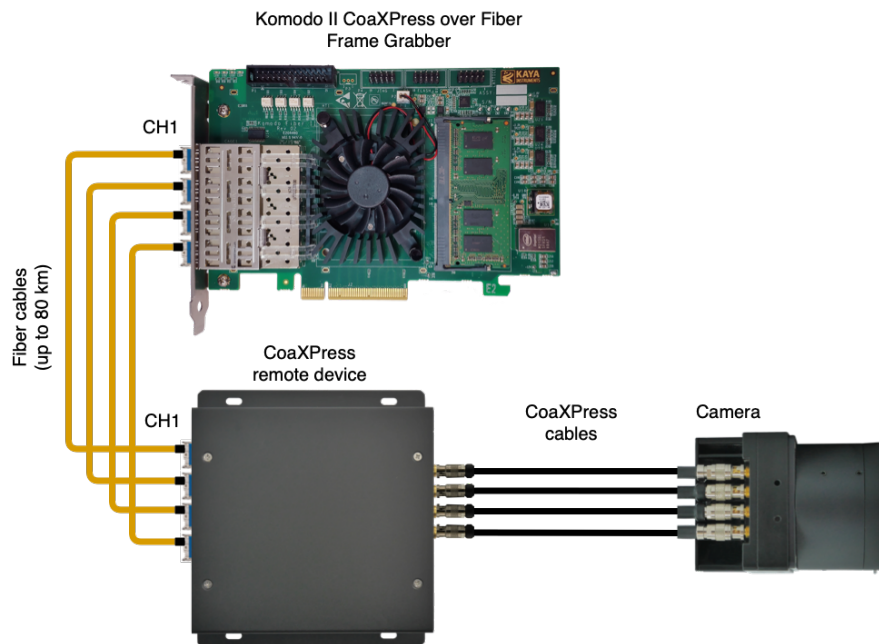


Figure 14 – Bidirectional camera link connection

8 Firmware

It is recommended to perform firmware update after factory FPGA Programming. The KAYA Instruments devices support firmware update via Vision Point GUI.

8.1.1 Frame Grabber firmware

To initiate firmware update the following steps should be taken:

1. Launch Vision Point application.
2. Select Komodo II CoF Frame Grabber from the combo box before starting a firmware update.
3. Click “Create new project” to create new project from scratch or open an existing one.
4. In the Toolbar Menu, under Device Control tab, chose the “Firmware update” option. A new window will open displaying the current device firmware version.
5. Click “Browse...” button and select the desired firmware version, in accordance with the device chosen (.bin file extension) and Click “Next >” button.
6. The next window will display both, current and new firmware. By clicking the “Next >” button, the conformation is made, and the firmware update will start immediately.
7. **Do not interrupt the process!** In case of an error, the firmware update will fail and return to previous operation mode.
8. After successful update a full PC power off cycle is required to activate the new firmware.
9. Turn on the PC and check the firmware version by opening the Vision Point application, Frame Grabber tab. The firmware version located under Hardware information. Make sure that the firmware version matches the version supplied. That will ensure the success of the firmware update operation.

For full information about firmware update, please refer to the Vision_Point_II_API_Data_Book.

8.1.2 Remote device firmware

A Mini USB port is available for individual link & general information status and firmware update. The port uses a Silabs CP2101 chip. A driver from the Silabs website might have to be installed on certain PCs to gain access to the terminal port. Free supporting driver can be found at: <https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers>.

For full information about configurations, commands and firmware update, please refer to the Camera Link compatible Range Extender over Fiber User Manual.

9 Ordering information

Item name	Item part number
FXP II Acquisition system	KY-FXP-II
CoaXPress Range Extender over Fiber – device unit	KY-FEXT-II-D
Komodo II CoaXPress over Fiber Frame Grabber	KY-FGF-II-COF
SFP+ single-mode module 10 km	KY-SFP-10GLR-31
SFP+ multi-mode module 300 m	KY-SFP-10G85-3M
SFP+ bidirectional connection module (pair)	KY-BSFP-10G
Fiber cable - single-mode x meter	KY-FCA-S-SM-XX.X
Fiber cable - multi-mode x meter	KY-FCA-S-MM-XX.X
Coaxial cable x meter	KY-XX-XX.X
Power supply 24V, 90W	KY-PWR24_90

Table 3 – Ordering Information

(*) Please contact KAYA Instruments for exact Part Number or refer to our website at: www.kayainstruments.com/product-category/miscellaneous/cables-assembly.

We are offering variety of modules and customized cable assembly, to fit your application exact needs.

Please, Contact KAYA Instruments representative for any question and services.

We have the expertise and experiences to develop a suitable solution dedicated to customer's application, prototypes or production.

REFERENCES

Supported vision standards:



Vision Point documentation:



TECHNICAL SUPPORT AND PROFESSIONAL SERVICE

If you searched the documents and could not find the answers you need, contact KAYA Instruments support service:

Create a support request on the web: info@skyblue.de
Our knowledge base is available on: info@skyblue.de

Visit us at www.skyblue.de for comprehensive information.

SUBMITTING A SUPPORT REQUEST

When opening a support request, please provide the following information when applicable:

For Frame Grabbers:	For Camera:	For Range Extender:
Vision Point Diagnostic Info* Serial number of Frame Grabber Camera model SFP+ module model CoaxPress/Fiber cable model and length External power or PoCXP PC motherboard model *In the Vision Point app, use menu option Help > Collect diagnostic info.	Vision Point Diagnostic Info (or frame grabber being utilized) Serial Number of Camera XML dump and/or description of how the camera is being utilized Description of issue SFP+ module model CoaxPress/Fiber cable model and length External power or PoCXP	Range Extender Model Serial Number of Range Extender SFP+ module model CoaxPress/Fiber Cable model and length PC configuration Operating System Software Revision Camera and Frame Grabber Manufacturer and Model

International Distributor



Sky Blue Microsystems GmbH
Geisenhausenerstr. 18
81379 Munich, Germany
+49 89 780 2970, info@skyblue.de
www.skyblue.de

Please feel free to contact our sales team for pricing, availability, documentation or customization through our e-mail or phone, we will be happy to provide assistance and consultation.

Sales Inquiries: info@skyblue.de



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