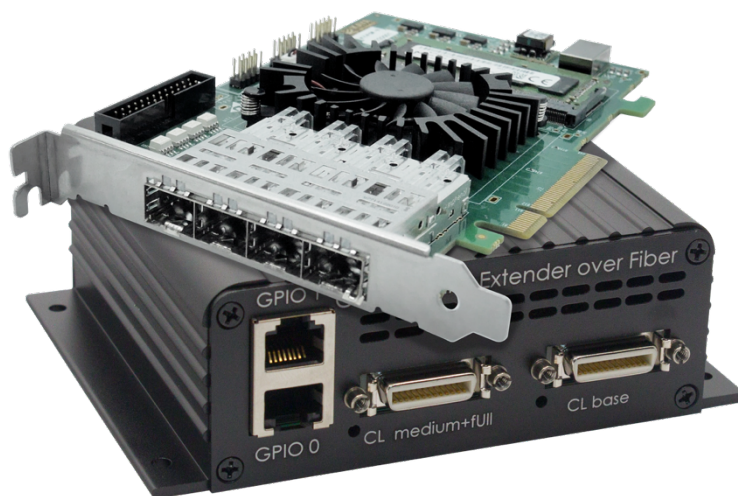


Camera Link compatible FXCL II Acquisition system Hardware Reference & Installation Guide

May 2024
Rev 1.0



International Distributor

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1 Revision History

Version	Date	Notes
1.0	05.2024	Initial Release

Table 1 – Revision History

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4 Introduction

4.1 Safety precautions

With your **FXCL II Acquisition system (KY-FXCL-II)** 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-FXCL-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

FXCL II Acquisition system is the industry most advanced Camera Link 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, while each Camera Link Full interface translated to single fiber cable.

The **FXCL II Acquisition system** is capable of receiving video streams from Camera Link Full camera while such interface supports standard Camera Link bitrates up to 85 MHz. This system is ideally suited for industrial, defense and aerospace Machine Vision Systems and applications.

The system consists of Komodo II CLHS compatible frame grabber and CameraLink to Fiber device. The remote unit converts CameraLink interface to fiber optic interface.

The **FXCL 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 **FXCL II Acquisition system** consists of an extender device unit (KY-CL2F-D) that translates the CameraLink interface to fiber optic interface and a Komodo II CLHS compatible Frame Grabber (KY-FGF-II-CLHS) that is able to acquire video directly from fiber optic cables.

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

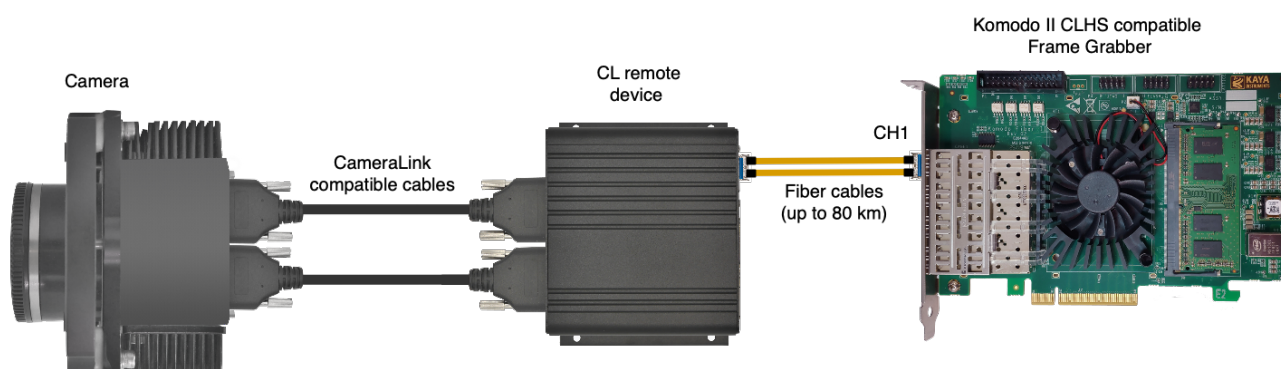


Figure 1 – KY-FXCL-II single camera topology block diagram

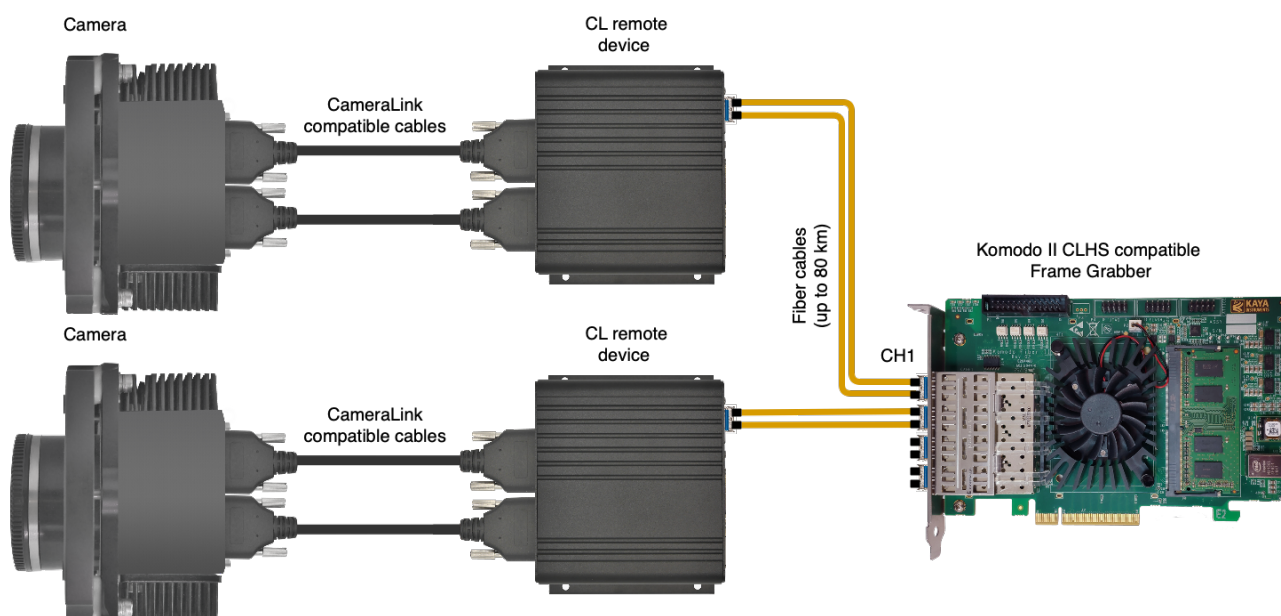


Figure 2 – KY-FXCL-II dual camera topology block diagram

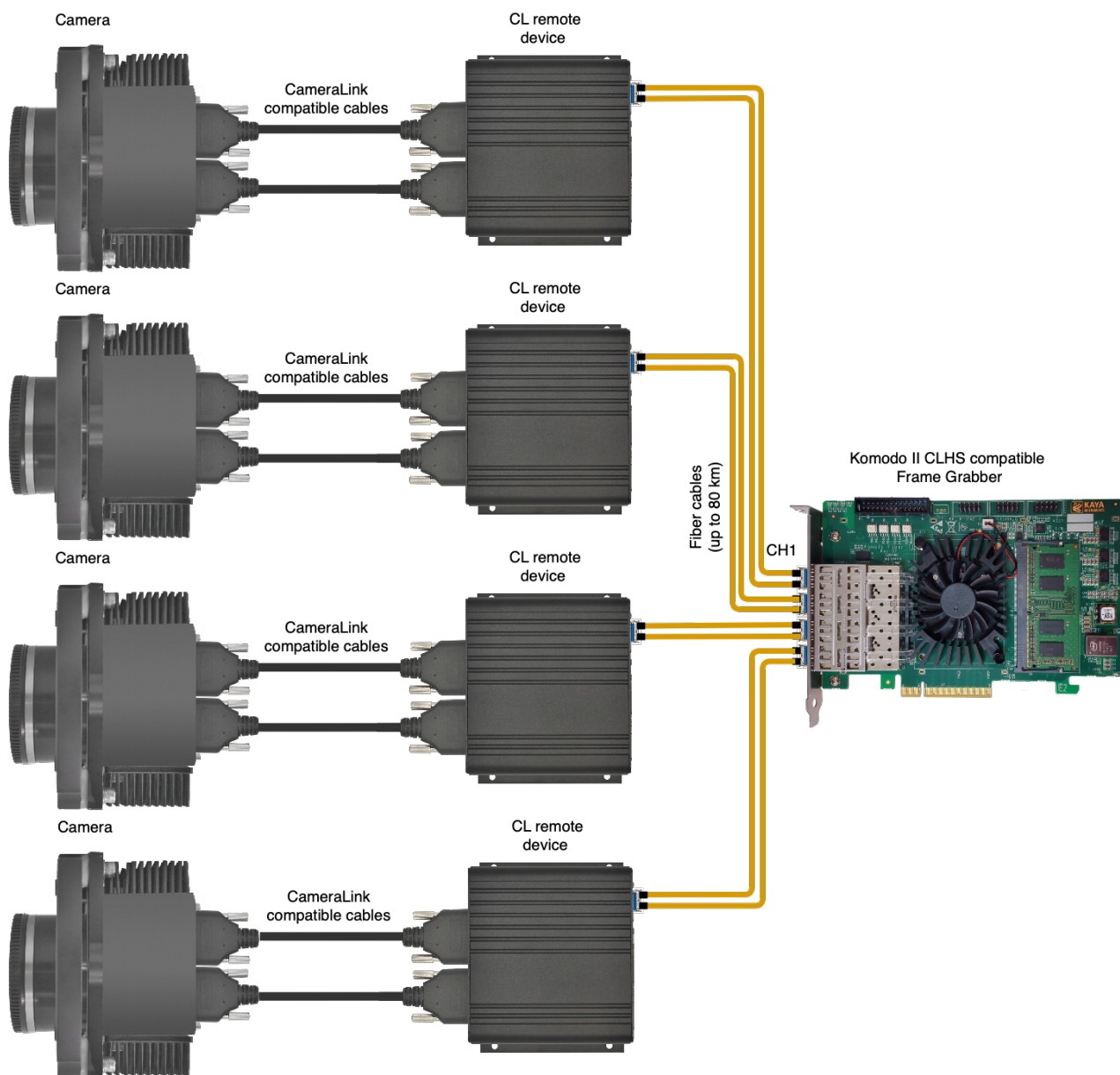


Figure 3 – KY-FXCL-II quad camera topology block diagram

7 Installation and Configuration

7.1 Installation procedure

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

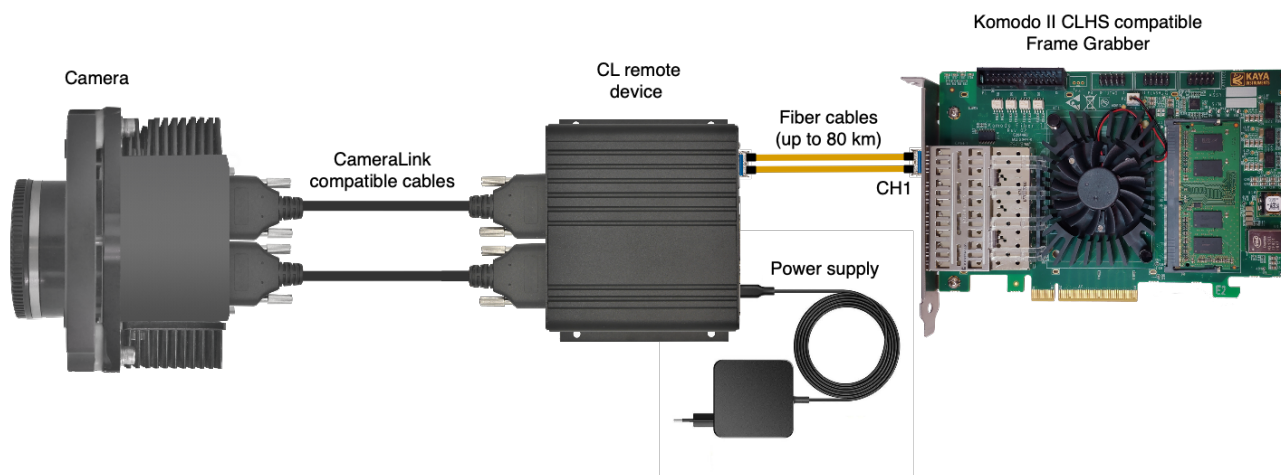


Figure 4 – KY-EXT-CL connection diagram

The first stage of the system installation is **Komodo II CLHS compatible Frame Grabber** board installation as described in section 7.2.1. The second stage is installation of the SFP+ modules and fiber cable allowing the connection between the **Camera Link compatible Extender Device (KY-CL2F-D)** and the **Komodo II CLHS compatible Frame Grabber**, described in section 0. The third stage is connection of **KY-CL2F-D** unit and **Camera Link compatible camera** as described in section 7.3.

7.2 Power Supply

This device requires 12V power supply for proper function. The positive pin of the power supply connected to the bottom pin of the connector, shown as “12V”, the negative pin connected to the upper right pin of the connector, shown as “GND”. The power connector shown in Figure 5. The power connector used in KY- CL2F-D (device) unit is Tini-QG RA PC 3 pin (TRA3M SERIES). The mating connector of the power connector is TA3FX.



Figure 5 – KY-CL2F-D power connector

7.2.1 Komodo II CLHS compatible Frame Grabber installation

Before system installation the Komodo II CLHS compatible Frame Grabber board should be installed into host computer. Komodo II CLHS compatible 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 CLHS compatible 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 CLHS compatible board to PCIe connector of the motherboard.
5. Anchor the PCIe bracket to the computer chassis using M3 screw.
6. Verify the Komodo 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 CLHS compatible board will be installed during installation of Vision Point software application.

You can install and use multiple Komodo II CLHS compatible Frame Grabbers in a single computer.

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

7.2.2 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.

7.2.3 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.

7.2.4 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-CL2F-D fiber interface.

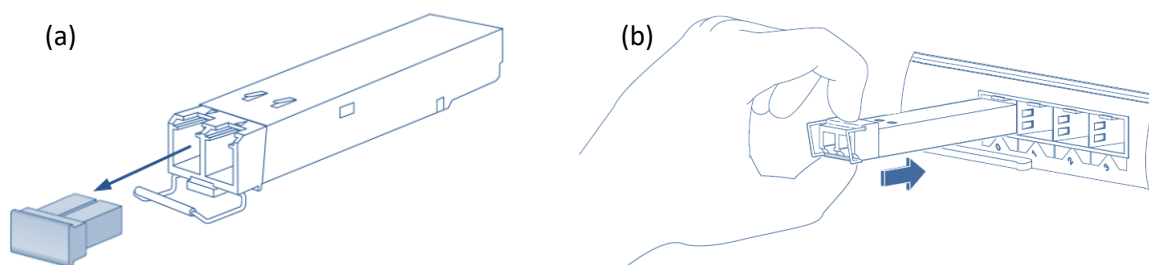


Figure 6 – SFP+ Module Installation.

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

7.2.5 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-CL2F-D to Komodo II CLHS compatible Frame Grabber.
 - c) A fiber cable should match an SFP+ type. If a single mode SFP+ is used a single mode fiber (yellow) should be attached to it. If a multi-mode SFP+ is used a multi-mode fiber (orange) 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-CL2F-D and RX input (Marked with RX or Arrow inwards the SFP+) on the Komodo CLHS compatible 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-CL2F-D.

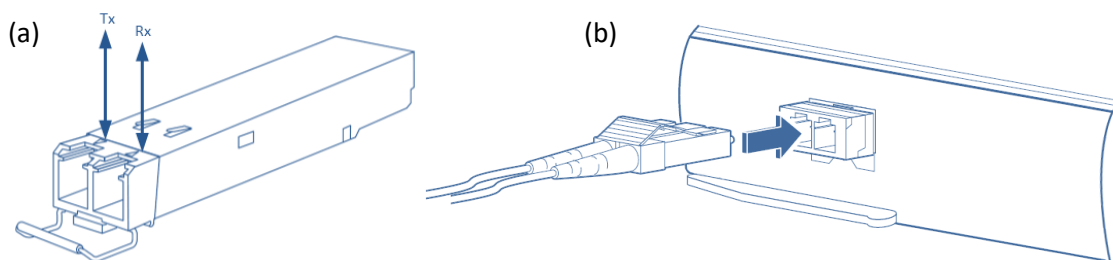


Figure 7 – Interface connecting to the SFP+ Module
(a) SFP+ module with TX output and RX input marked, b) Connecting the cable to SFP+ Module

7.2.6 Removing the SFP+ Module

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

1. Turn the KY-CL2F-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).

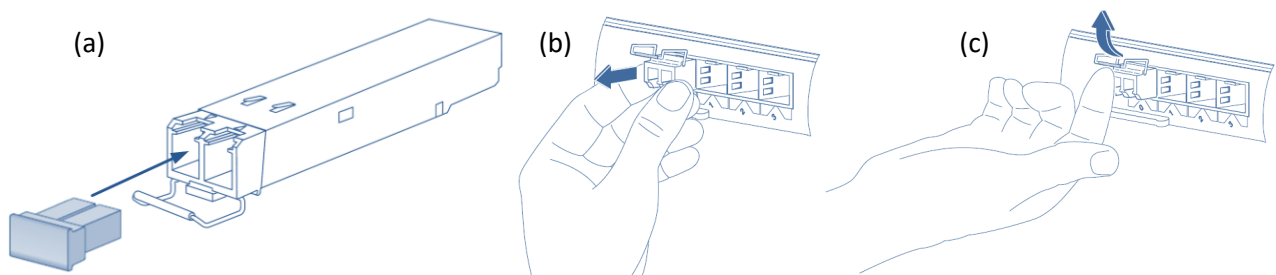


Figure 8 – Removing the SFP+ Module

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

7.3 Completing the KY-FXCL-II system installation

In order to properly complete the **KY-FXCL-II** system installation, the following steps must be taken:

1. Connect the CameraLink cables between the camera and KY-CL2F-D unit.
2. Connect the Power Adaptor to the KY-CL2F-D unit.
The KY-CL2F-D requires 12 V power supply for proper function of the camera.
3. The power supply connector of the KY-CL2F-D unit shown in Figure 4.
4. Connect the camera to a power supply (Regardless of the supported camera's communication cable).
5. Turn the KY-CL2F-D, the CameraLink camera and the computer on and start your Vision Point software application.

7.4 Reducing the fiber optic cable count

The system requires duplex fiber optical cable in order to properly operate, but sometimes it required transferring the data over simplex fiber cable or installing the system into existing CWDM infrastructure. Several options listed in the sections below exist in order to achieve the above. Please note that these options are available for single mode fiber infrastructure only.

Please contact KAYA representative for details of those options.

7.4.1 CWDM SFP+ option

In CWDM option the SFP+ is replaced by CWDM SFP+ that is able to transmit and receive the data on specific wavelength. By using these SFP+ modules, the system can be integrated into existing CWDM infrastructure by usage of external CWDM MUX.

Please contact KAYA representative for details.

7.4.2 Bidirectional (BIDI) SFP+ option

This option allows using a simplex fiber cable in the system. In this option the SFP+ is replaced by bidirectional (BIDI) SFP+ that transmits and receives on the same fiber core. Example connection is described in Figure 9.

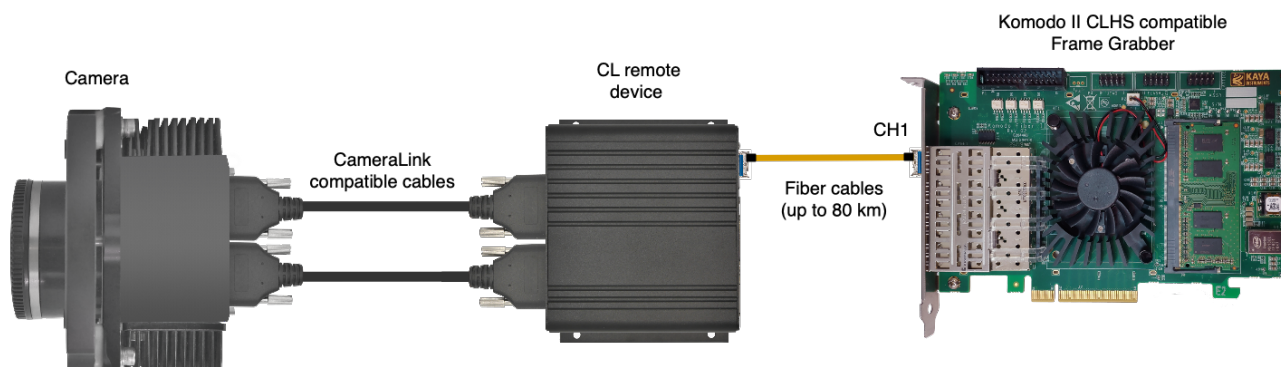


Figure 9 – Bidirectional Camera link connection

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 Frame Grabber firmware

To initiate firmware, update the following steps should be taken:

1. Launch Vision Point application.
2. Select Komodo II CLHS compatible 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_API_Data_Book.

8.2 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 Range Extender CoaXPress over Fiber User Manual.

9 Ordering information

Item name	Item part number
FXCL II Acquisition system	KY-FXCL-II
Camera Link compatible Range Extender over Fiber – Device unit	KY-CL2F-D
Komodo II Quad CLHS compatible Frame Grabber	KY-FGF-II-CLHS
SFP+ single-mode module	KY-SFP-10GLR-31
SFP+ multi-mode module	KY-SFP-10GSR-85
SFP+ single-mode bidirectional module	KY-SFP-BD-10G-10
Fiber cable	KY-FCA-X
Camera Link Cable	KY-CCL-X
Power supply 12 V, 60 W	KY_PWR12_60

Table 2 – Ordering Information

Please contact KAYA Instruments for exact cables Part Number or refer to our website at:

<https://kayainstruments.com/product-category/accessories/>.

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: www.skyblue.de
- Our knowledge base is available on: www.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

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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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