IQ² Development
IO-Link Intelligent Components

FAQ of
IQ² Development products

Services and Products

We offer the following services and products:

- iqStack Device and Master licenses (Vendor ID locked)
- IO-Link technology educational trainings or consulting services
- Hardware integration services for both stacks
- iqInterface (Comport/USB/Ethernet to IO-Link converter with master and generic device functionality)
- iqLink (Low Cost Master)
- iqPDCT (Port and Device Configurations Tool) – the human interface to IO-Link
- iqMonitor (an IO-Link communication sniffer)

iqStack

Common

The iqStacks Master and Device are ANSI C implementations of IO-Link protocol version 1.0 and 1.1 for its master and device parts respectively. All basic features, described in IO-Link Specification V1.1, are supported from physical layer to application layer, including interleave mode, ISDU (SPDU) and data storage for master. The source code is well-documented and contains many integration hints and references to IO-Link Specification.

Both iqStacks are completely cross-platform and can be used in all C/C++ projects. They are just IO-Link logic and do not depend on any concrete microcontroller, communication chip (PHY) or operational system.

Approximate system requirements for device hardware are 4.5 Kbyte flash and 0.6 Kbyte RAM, for master 12 Kbyte flash and 0.8 Kbyte RAM per IO-Link port. All data is obtained from a build of the iqStacks by IAR Compiler for Renesas RL78 microcontroller (low level of optimization).

License model

The full **source code** of the iqStacks is available completely free of charge for evaluation (after official email request to us from the interested company). The evaluation versions of the iqStacks do not differ from commercial ones.

If one of the iqStacks is used in any **commercial** IO-Link device or master product the license has to be bought separately for iqStack Device or/and Master. The license policy of the iqStacks has a buy-out model. The license is vendor-locked. It can be used for all products of one vendor (in terms of product and vendor IDs which are distributed by IO-Link Consortium). No stickers/registration/serial numbers are required. With the bought license a customer obtains the full source code of the corresponding iqStacks and their free updates/bug fixes for IO-Link version up to 1.1.

We support all our customers per email regarding found problems in the iqStacks' IO-Link logic. Their integration or IO-Link specification support is available only as additional service. For example as consulting or integration to customer's hardware/application which is completely done by us.

Integration

A customer of iqStack should port it to the specific hardware platform and integrate it to the application of his product. The iqStack is shipped with an example of IO-Link application (dev_appl.c/mst_appl.c) and physical layer (dev_pl.c/mst_pl.c). The example contains many comments and hints how to port the iqStack to hardware and integrate the application. The stack integration implies anyway a good knowledge of IO-Link specification.

IO-Link specification requires a good accuracy (<1% for devices and <0,1% for masters) of IO-Link baudrates (4.8, 38.4 and 230.4 kbit/s) supported by the physical layer of device. If the microcontroller cannot support it then additional external quartz crystal can be required to generate tact for communication.

There are some examples of hardware which we had an experience with.

Microcontrollers:

- Renesas 78k/RL78/V850
- Renesas Rx100
- Atmel AT32UC3C1512C
- STM32
- Microchip dsPIC33E/PIC24E

PHY (IO-Link communication chips):

- ZMDi ZIOL2401 (master + device)
- ZMDI ZIOL2411 BI1W
- Elmos E981.12 (master)
- Maxim MAX14820 (device)
- Maxim MAX14824
- HMT 7742 (device)
- Linear Technology LTC2874
- Linear Technology LTC3669
- Texas Instruments TI SN65HVD101 / SN65HVD102
- ST L6360

We also provide the iqStacks integration into customers' products as a service which can be additionally offered to the bought license.

Consulting

Our company also offers additional IO-Link technology consulting, trainings and support services in German and English languages. We can arrange meetings or conference calls to clarify IO-Link or iqStacks integration questions of customers.

iqInterface

The iqInterface is a device which can be used as IO-Link master or generic customizable IO-Link device.
It is mainly supposed to be used for development, automatic testing and production of new IO-Link masters or devices. It has the following advantages:

- The iqInterface can be directly connected to PC over USB/Comport(RS232)/Ethernet instead of installing expensive production control system or bus to reach IO-Link device from PC.
- It has very simple and functional GUI for Windows to perform all basic IO-Link actions.
- It is shipped with communication DLL for PC and its open source code written in C with examples of application for MS Visual Studio and National Instruments CVI. The DLL is an implementation of simple open serial protocol for communication with PC.
- Direct mode allows forwarding arbitrary sequences of bytes from PC over the iqInterface to IO-Link device and back. This way C/Q line can be used directly without IO-Link. It can be used for implementing custom communication protocols instead of IO-Link for bootloader or parameterization in production.

The iqInterface GUI has the following features:

Master

- Configuration of System manager (cycle time, inspection level etc.) and 2kB Data storage (enable/disable/clear of DS, enable/disable of upload/download)
- Switch IO-Link mode Inactive(Fallback)/Preoperate/Operate
- Show current IO-Link state Inactive(Fallback)/Preoperate/Check fault/Operate
- ISDU index/subindex read/write request
- Get Process Data Input and Set Process Data Output, show/set validity
- Event receive
- Show connected device properties
- Recording of macro buttons (sequence of actions) which can be automatically repeated afterwards

The macros can contain switching IO-Link modes, ISDU requests, set PD Output and delays between actions. They can be used to program some device specific actions which consist of several IO-Link primitives.

Generic Device

- Configuration of IO-Link device direct page (min cycle time, IO-Link Revision 1.0/1.1, OD/PD structure, IDs etc.) and communication baudrate COM1/COM2/COM3
- Configuration of 2kB ISDU structure (arrange read/write data bytes to selected indexes/subindexes which are included in data storage)
- Show current IO-Link state Inactive(Fallback)/Preoperate/Operate
- Send device application event (with configuration of mode/type/code)
- Log of ISDU requests which are received from master
- Get Process Data Output and Set Process Data Input, show/set validity

All described actions can be programmed over C-DLL to perform them automatically in testing or production. The configuration of the iqInterface is saved in EEPROM so it can be reused after restart.

The iqInterface firmware can be updated over its GUI in case of new versions with new functions or bug fixes.

The version of iqInterface can be configured to support only some options which are necessary for the customer to fit its price. The options are support of master, generic device, USB/Comport/Ethernet functions etc.

We are also open to discuss implementing of customer specific functions for the iqInterface as additional service.

Technical details:

- 24V Power supply and Trigger-I/Os using standard industry connector
- Comport (RS232), USB and Ethernet Interfaces
- All communication and trigger connections are galvanically isolated
- Separate connection of IO-Link Master and IO-Link Device over M12 male/female connectors
- 24V power supply for connected devices can be switched on/off on both IO-Link ports in software
- Wall and hat rail montage

Web Links

IQ² Development products page: http://www.iq2-development.com/io-link-products