

IO-Link

Product Quality Policy

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This document has been prepared, approved, and released by the IO-Link Steering Committee.

Important notes:

NOTE 1 The IO-Link Community Rules shall be observed prior to the development and marketing of IO-Link products. The document can be downloaded from the www.io-link.com portal.

NOTE 2 Any IO-Link Device shall provide an associated IODD file. Easy access to the file and potential updates shall be possible. It is the responsibility of the IO-Link Device manufacturer to test the IODD file with the help of the IODD-Checker tool available per download from www.io-link.com.

NOTE 3 Any IO-Link devices shall provide an associated manufacturer declaration on the conformity of the device. A corresponding form with references to relevant documents is available per download from www.io-link.com.

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Conventions: In this specification the following key words (in **bold** text) will be used:

| | |
|----------------------------|---|
| may: | indicates flexibility of choice with no implied preference. |
| should: | indicates flexibility of choice with a strongly preferred implementation. |
| shall: | indicates a mandatory requirement. Designers shall implement such mandatory requirements to ensure interoperability and to claim conformity with this specification. |
| highly recommended: | indicates that a feature shall be implemented except for well-founded cases. Vendor shall document the deviation within the user manual and within the test report. |

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IO-Link Product Quality Policy – Organization and procedures

Management summary – scope of this document

This policy describes the necessary procedures on how to attain a manufacturer declaration for an IO-Link Master or Device and shall ensure the product quality.

Furthermore, in clauses 4 and 5 it gives hints

- for the successful preparation of testing,
- steps to create a manufacturer declaration,
- for brand labelling.

Overview of related documents

The IO-Link Community uses a set of policies to organize work of its members, providers, and test centers and to maintain quality assurance (mainly interoperability) of member products as shown in Figure 1. The technical specifications ([2], [3], and [4]) are building a technical platform for a certain generation of Devices and Masters. Consistent versions of the specifications are bundled to a Package and supposed to stay stable for several years.

The quality of products is stated only by a Manufacturer Declaration based on tests and referenced test reports.

All IO-Link implementations shall use valid specifications at that time. All valid specifications and documents are available on IO-Link.com and listed in [11]

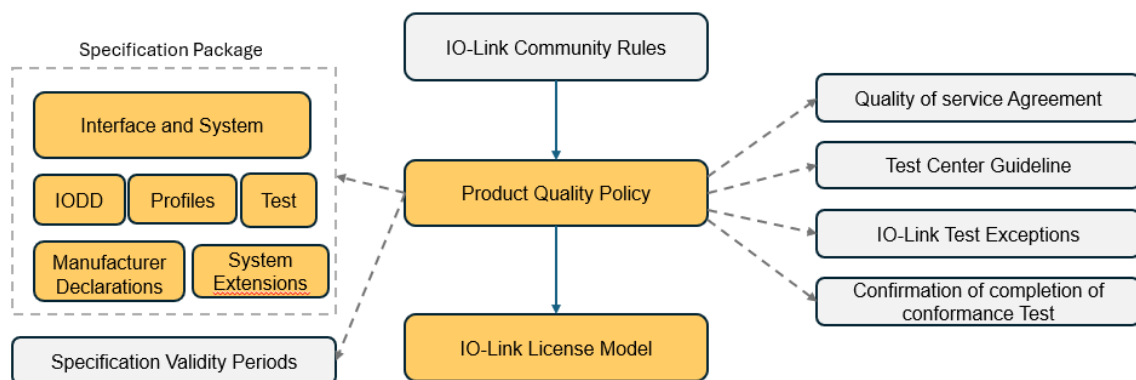


Figure 1 – Related documents

Table 1 provides information on IO-Link's technical and policy documents.

Table 1 – Subject of IO-Link's technical and policy documents

| Title of document | Subject | Ref |
|---|---|----------|
| IO-Link Interface and System | Specification of IO-Link interface, communication, and engineering technology | [1], [2] |
| IO-Link IO Device Description | Specification of IO-Link Device parameters in a formal language (XML) | [3] |
| IO-Link Test | Specification of TestCases for physical tests and behavioral tests for Devices and Master | [4] |
| IO-Link Community Rules (Body of rules between IO-Link members and the PNO) | This document governs the cooperation between IO-Link members or licensees and the PNO and describes the rights and obligations of the partners. | [5] |
| IO-Link License Model | This document describes the license model for non-IO-Link members. | [6] |
| Quality of Services Agreement | This document is an agreement between IO-Link Community and the IOL-Competence Centers (IOLCC) for the technologies of IO-Link to assure quality of services. | [7] |
| Test Center Guideline | This document describes the preconditions for becoming a test laboratory approved by IO-Link community. It additionally describes the rules for the performance of such an IOL Test Center (IOLTC). | [8] |
| IO-Link Exceptions | This document describes the change and exception management in case of implementation or test deviations. | [9] |
| Confirmation of completion of conformance tests | This document is the test confirmation of an IOL Test Center (IOLTC) or a brand label provider. | [10] |
| Specifications validity periods | The document provides an overview of available IO-Link specifications and rules their current status of validity within the life cycle. | [11] |
| Package | Set of specifications | [12] |

32 Terms, definitions, and abbreviated terms

33 3.1 Terms and definitions

34 For the purposes of this document, the terms and definitions given in [2], [3], and [4], as well
35 as the following apply.

36 3.1.1

37 IO-Link specifications

38 This are system specification, system extensions, profile specifications, IODD specification and
39 related test specifications

40 3.1.2

41 IO-Link Service Center

42 Central office of the IO-Link community, see publisher

43 3.1.3

44 Approved component list

45 The Approved component list comprises all devices with available IODDs by publishing the MD
46 on the community hosted IODDfinder

47 3.1.4

48 Master Tester

49 Tool, intended to perform test cases for IO-Link Master according to the IO-Link test specifica-
50 tion, approved by IO-Link quality authorities

3.1.5**Device Tester**

Tool, intended to perform test cases for IO-Link Devices according to the IO-Link test specification, approved by IO-Link quality authorities

3.1.6**IODD**

electronic I/O and parameter description in XML of an IO-Link Device for its configuration and parameterization to match certain application requirements

3.1.7**DeviceID**

unique IO-Link Device identification allocated by a vendor

3.1.8**VendorID**

unique vendor identification assigned by the IO-Link Community

3.1.9**MasterID**

unique IO-Link Master identification allocated by a vendor

3.2 Symbols and abbreviated terms

| | |
|-------|---------------------------|
| IOLCC | IO-Link Competence Center |
| IOLTC | IO-Link Test Center |
| DUT | Device under test |
| MD | Manufacturer declaration |

Manufacturer declaration**4.1 General rules**

- The Manufacturer Declaration states compliance to the IO-Link specifications and shall be signed by vendors and made available to customers.
- For the reason of functionality and interoperability, the implementation of the common profile (part identification and diagnosis) is highly recommended.
- Profiles shall be implemented and tested according to the profile specifications.
- Brand labeled products require the Vendor ID (VID) of the branding company.

Important note:

Exceptions for not implemented "highly recommended" features specified in [2] or profiles shall be documented within the user manual and the manufacturer declaration.

- Exceptions against the IO-Link specifications shall be handled according to the rules defined in [9].
- Members are entitled to perform the required tests under their own responsibility. The Manufacturer Declaration has no expiring date.
- Non-members are obliged to provide a signed document "Confirmation of completion of conformance tests" [11] to the IO-Link Service Center to get an IO-Link licence. See IO-Link License Model [6].
- For extensions like IO-Link Safety or IO-Link Wireless different MDs may be required.

4.2 The way to manufacturer declaration (MD)

The preconditions for an MD are:

- Each family of Devices or Masters shall be well defined to be listed later in the MD,
- Prerequisites for Devices are VendorID, DeviceID and IODD,
- Prerequisite for Masters are VendorID and MasterID

4.2.1 Steps for IO-Link members

- 1) Execute IO-Link conformance to specifications and test specifications.
- 2) Fill out and sign the MD.
- 3) Add the MD to the Approved component list.

4.2.2 Steps for non-IO-Link members (licensee)

- 1) Contact an IO-Link Test Center or the brand label provider to get the "Conformance test commitment for licences" to apply for a VendorID (see [6]).
- 2) Apply for a VendorID at the IO-Link Service Center.
- 3) Ask IO-Link Test Center or the brand label provider for the "Confirmation of completion of conformance tests" (see [10]).
- 4) Fill out and sign the MD.
- 5) Provide the MD and the "Confirmation of completion of conformance tests" (see [10]) to the IO-Link Service Center to get the licence.
- 6) Add the MD to the Approved component list.

4.3 Additional procedures regarding re-testing

4.3.1 General approach

This clause describes the recommendations for re-testing whenever changes have been made at an already tested Device or Master. Either a full test or a partial test shall be performed. This leads to a new test report and a corresponding MD.

Due to the increasing complexity of Device variants, the following clause can only cope with fundamental deviations of the IO-Link interface (communication and/or timing). Other deviations should be negotiated between manufacturer and an IOLTC.

4.3.2 Devices

Table 2 shows the consequences of fundamental changes/deviations in a Device.

Table 2 – Consequences of changes to the Device interface

| Changes/deviations | New DeviceID | Physical layer test | EMC test | Protocol test | New MD |
|--|--------------|---------------------|----------|---------------|--------|
| Software changes in application new functions / parameters | X | | | X | X |
| Software changes influencing communication / timing | X | X | | X | X |
| Hardware changes influencing communication | | X | X | | X |
| NOTE Communication software is part of the Device software, which represents the implementation of the protocol layers, data objects, methods and interfaces as defined in [2]. | | | | | |

4.3.3 Masters

Table 3 shows the consequences of fundamental changes/deviations in a Master.

Table 3 – Consequences of changes to the Master interface

| Changes/deviations | New MasterID | Physical layer test | EMC test | Protocol test | New MD |
|--|--------------|---------------------|----------|---------------|--------|
| Software changes influencing communication / timing | X | X | | X | X |
| Hardware changes influencing communication | | X | X | X | X |
| NOTE Communication software is part of the Master software, which represents the implementation of the protocol layers, data objects, methods and interfaces as defined in [2]. | | | | | |

Testing and test tools

5.1 Prerequisites for type testing

Table 4 shows the prerequisites for type testing of Device and Master. For testing the latest test systems related to the Package shall be used. The Package and the document “Specifications Validity Periods”[11] are published on IO-Link.com.

Table 4 – Prerequisites for type testing

| Type | Final product before release | IODD (checked, stamped) | VendorID | DeviceID | MasterID |
|--------|------------------------------|-------------------------|----------|----------|----------|
| Device | X | X | X | X | – |
| Master | X | – | X | – | X |

5.2 Test of an IODD (only for Devices)

Every Device manufacturer shall provide an IODD file for the DUT. The IODD describes the features of a Device (I/O data structures and parameters), which are also used by Device testers for protocol tests.

The correctness of the IODD file shall be tested with the help of the actual version of the IODD checker.

5.3 Test of the physical layer (PL) and EMC

The PL and EMC tests shall be performed according to [2] and [4].

5.4 Test of the Protocol

The protocol test shall be performed according to [4]. In case of Devices a checked IODD shall be used for the test.

5.5 Tools for testing

There are several test systems on the market supporting tests and generating test reports, which are approved by the IO-Link quality authority.

These test systems comprise

- Physical layer Tester
- EMC tester
- Device Tester (protocol)
- IODD checker

154 • Master tester

155

Quality center

The IO-Link community is operating a Quality Center for the clearing of MD relevant quality complaints.

Complaints shall be reported in english language via e-mail to quality@io-link.com.

Bibliography

- [1] IEC 61131-9, Programmable controllers – Part 9: *Single-drop digital communication interface for small sensors and actuators (SDCI)*
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- [3] IO-Link Community, *IO Device Description (IODD)*, Order No. 10.012
- [4] IO-Link Community, *IO-Link Test*, Order No. 10.032
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- [6] IO-Link Community, *IO-Link License Model*, Order No. 10.302
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- [11] IO-Link Community, *Specifications validity periods* on IO-Link.com Order No. 10.312
- [12] IO-Link Community, *Packages* on IO-Link.com

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