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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CONTENTS

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 [10]

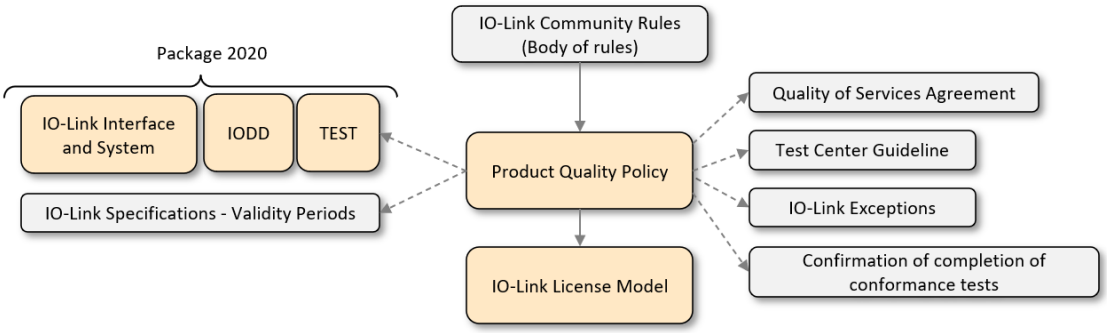

Figure 1 – Related documents

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]

Title of document	Subject	Ref
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 accredited 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]
IOL SpecificationValidity	This document contains a list of all valid specifications and their validity phase out with transition periods	[10]
Confirmation of completion of conformance tests	This document is the test confirmation of an IOL Test Center (IOLTC) or a brand label provider.	[11]

Terms, definitions, and abbreviated terms

3.1 Terms and definitions

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

3.1.1
IO-Link specifications
This are system specification, system extensions, profile specifications, IODD specification and related test specifications

3.1.2
IO-Link Service Center
Central office of the IO-Link community, see publisher

3.1.3
Approved component list

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

3.1.4
Master Tester
Tool, intended to perform test cases for IO-Link Master according to the IO-Link test specification, 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.
- It is only allowed to launch new IO-Link products on the market within the validity period of specification [10].
- 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 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 Master are VendorID and MasterID

4.2.1 Steps for IO-Link members

1) Excecute IO-Link conformance tests successfully and completely.
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 [11]).
4) Fill out and sign the MD.
5) Provide the MD and the “Confirmation of completion of conformance tests” (see [11]) 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.

126 **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].					

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128 # Testing and test tools

129 ## 5.1 Prerequisites for type testing

130 Table 4 shows the prerequisites for type testing of Device and Master.

131 **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

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133 ## 5.2 Test of an IODD (only for Devices)

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

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

139 ## 5.3 Test of the physical layer (PL) and EMC

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

141 ## 5.4 Test of the Protocol

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

144 ## 5.5 Tools for testing

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

147 These test systems comprise

148 • Physical layer tester
149 • EMC tester
150 • Device tester (protocol)
151 • IODD checker
152 • Master tester

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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

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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*

[5] IO-Link Community, *IO-Link Community Rules (Body of Rules)*, Order No. 3.702

[6] IO-Link Community, *IO-Link License Model,* Order No. 10.302

[7] IO-Link Community, *IO-Link Quality of Services Agreement,* Order No. 10.052

[8] IO-Link Community, *IO-Link Test Center Guideline,* Order No. 10.142

[9] IO-Link Community, *IO-Link Exceptions*, Order No. 10.232

[10] IO-Link Community, *IOL_SpecificationValidity,* Order No. 10.312

[11] IO-Link Community, *Confirmation of completion of conformance tests,* Order No. 10.412

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