



SIEMENS



Industrial Communication

The innovative interface for the last few meters to the process

IO-Link: optimal integration of sensors and actuators

[siemens.com/io-link](https://www.siemens.com/io-link)

# Complete communication down to the last meter: the IO-Link point-to-point interface

In order to meet demands for consistent reduction of costs, the market is calling for an open, standardized and cost-effective system for linking actuators, sensors and other field devices to the automation system. High availability and transparency of the plant require systematic diagnostic concepts and efficient handling of parameter data at all levels of the automation system. IO-Link meets the demands of the market and offers new possibilities for the integration of actuators and sensors into the automation network.

IO-Link: the innovative interface for the last meter to the process.

## IO-Link – more than just another interface

IO-Link is the smart concept for the standardized connection of sensors and switching devices to the control level by means of a low-cost point-to-point interface. The new IO-Link communication standard below the field bus level permits central diagnosis and location of faults as far as the sensor/actuator level and simplifies not only the commissioning, but also the maintenance, by allowing parameter data to be modified dynamically directly from the application.

The increasing intelligence of field devices and their integration into the overall automation system permit access to data right down to the lowest field level. The result: higher plant availability and reduced engineering expenses.

As an open interface, IO-Link can be integrated into all common field bus and automation systems. Consistent interoperability ensures that existing investments are well protected. This also applies within the context of existing machine concepts for the continued use of sensors that do not have an IO-Link interface.

## United for consistent quality

The communication standard was developed by the members of the IO-Link Group – leading suppliers of automation products who have joined forces to support the new concept in all areas of control technology, sensor and actuator systems. The work of the IO-Link Group is based on the specification. This is part of IEC 611 31-9 and has already been published as a draft by the IEC.

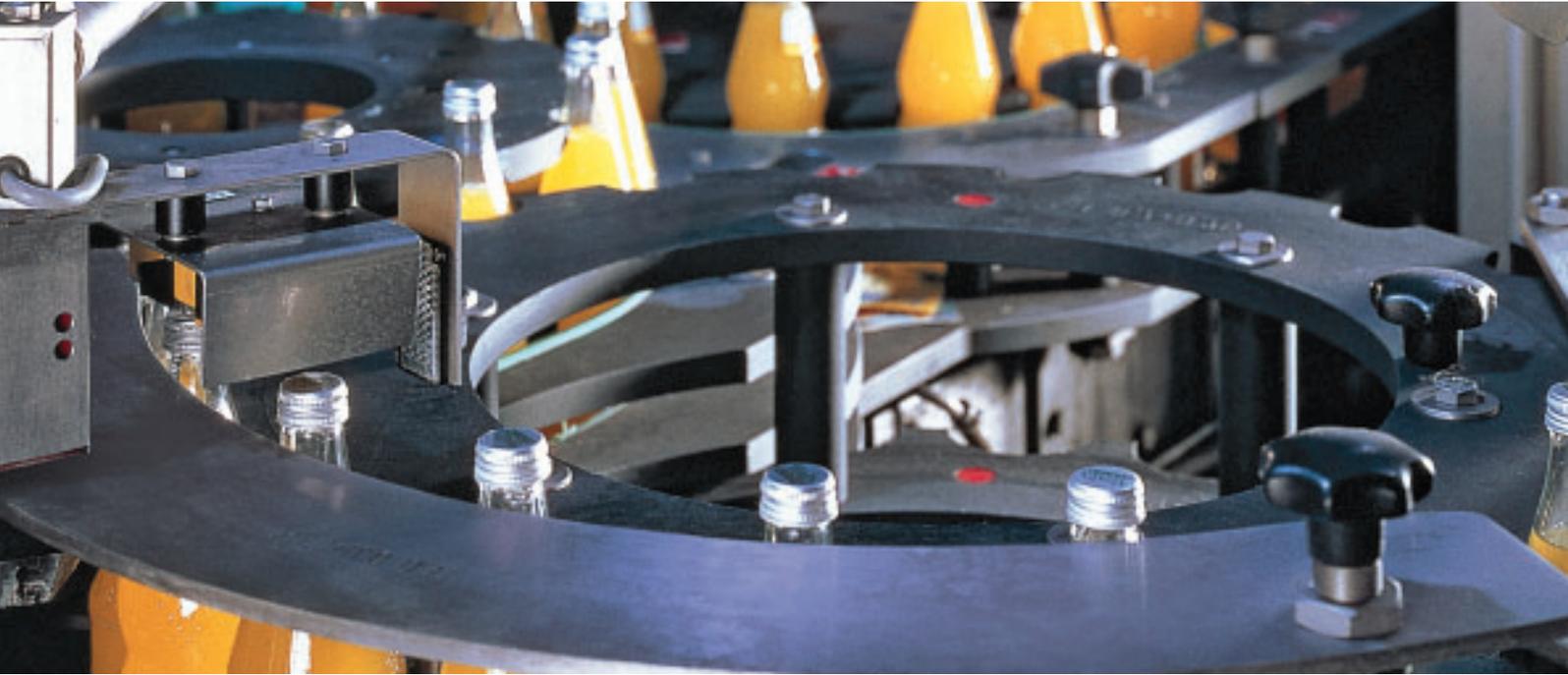
Greater demands are being made on integrated communication systems. At the same time, the number of field devices, sensors and actuators is growing rapidly – while the level of intelligence is also rising. IO-Link offers the solution to these requirements and is regarded by the manufacturers as a valuable supplement to the communications landscape (including AS-i).

As a committed promoter of this topic, Siemens will not only develop its range of products and systems in future, but will also deliver an unparalleled, continuous communications solution by incorporating IO-Link into Totally Integrated Automation.

Suitable protective measures (including IT-Security, e.g. network segmentation) must be taken in order to ensure safe operation of the plant. You can find more information about Industrial Security on the Internet.



# IO-Link – convincing arguments throughout



In the fiercely competitive global machine market, customers expect reliable machines that make a quick return on investment.

## **Innovative IO-Link machine concepts ensure: Simplification of the installation**

- Parallel wiring is replaced on a large scale by IO-Link
- Analog signal routes are replaced
- Interfaces and cables are standardized to a single type
- Modular machine concepts can be supported with excellent results
- Unique integration from the MES level down to the field level
- Standardized and significantly reduced wiring of various actuators/sensors
- High-speed commissioning by means of central data storage

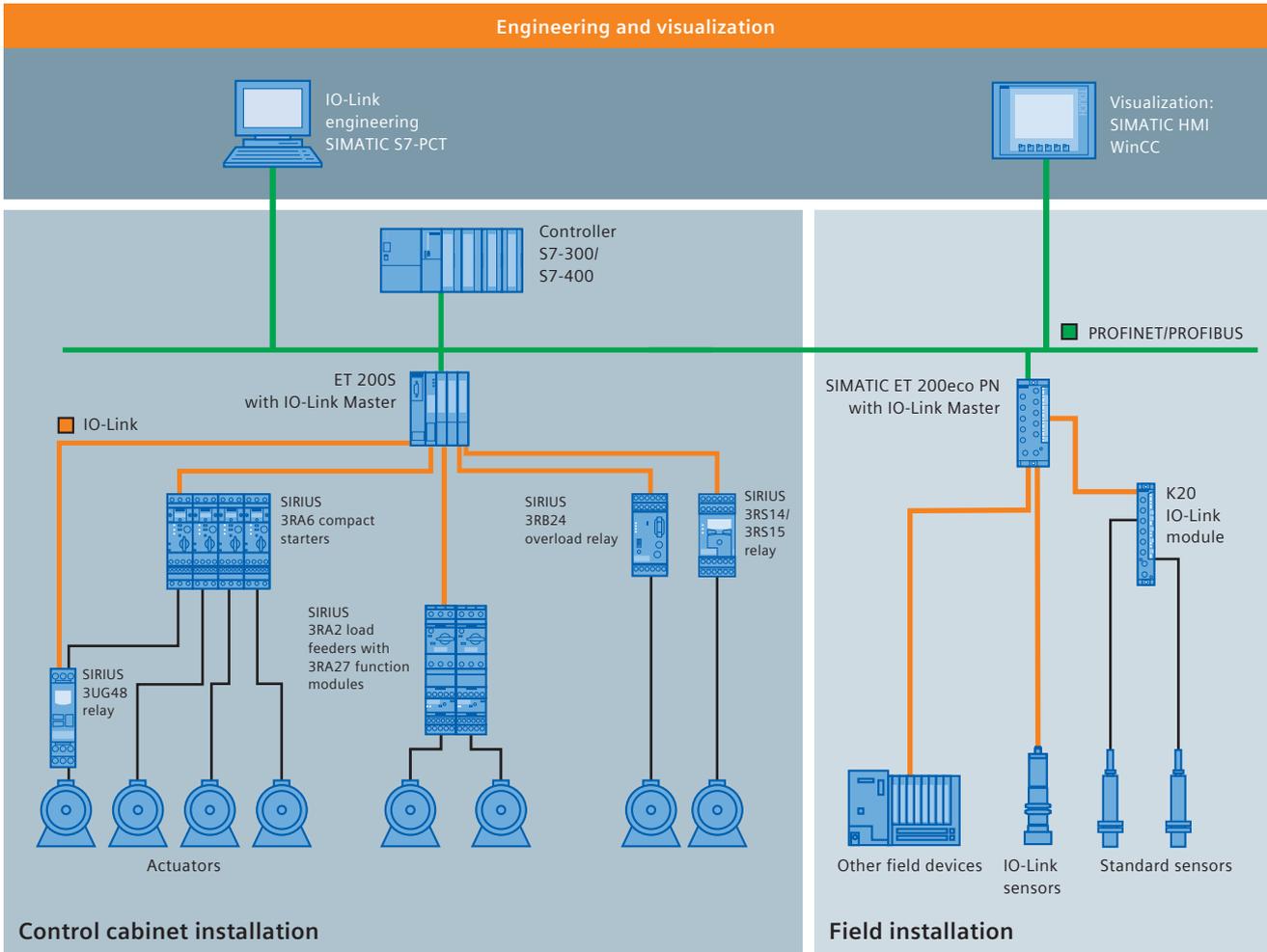
## **Automated parameterization**

- Automated parameterization by means of function blocks
- Tool-supported parameterization

## **Extended diagnostics**

- Diagnostics, even remote diagnostics, as far as field device level
- Cable break detection
- Device-dependent diagnosis via IO-Link

# Unparalleled integration: IO-Link integrated into Totally Integrated Automation



## IO-Link integrated into Totally Integrated Automation – advantages at a glance:

### Innovative control cabinet design

- Access to energy data for integration into energy management systems
- Transparent diagnostics for integration into maintenance systems
- Reduced wiring and space requirement in control cabinet

### Open engineering

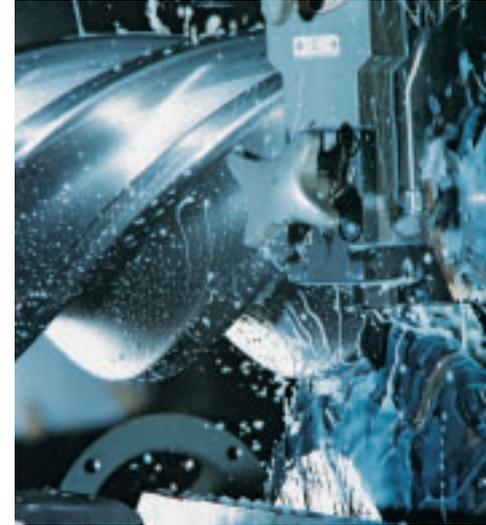
- Pre-integration of Siemens devices into SIMATIC HMI
- Freely available function blocks for SIMATIC for convenient parameterization and diagnostics
- Open system for connection of IO-Link-compliant devices

# IO-Link: Highlights

## Engineering

### Reduced engineering times

- Standardized, open system for greater flexibility (IO-Link devices from third-party suppliers can be integrated in the engineering)
- Standardized, transparent configuration and programming by means of integrated engineering (SIMATIC STEP 7)
- Freely available function blocks for SIMATIC for convenient parameterization and diagnostics, as well as for reading out measured values
- Efficient engineering due to pre-integration of Siemens devices into SIMATIC HMI
- Low error rate during CAD circuit diagram design due to reduction of control current wiring



## Installation and commissioning

### Shorter commissioning times

- Faster installation with minimized failure rate due to reduction of the control current wiring
- Less space needed in the control cabinet
- Economical wiring technology with several load feeders due to unrestricted use of existing Siemens components



## Operation and maintenance

### Increased plant availability

- High level of transparency in the plant right down to the field level
- Shorter standstill and maintenance downtimes due to plant-wide diagnostics and faster troubleshooting
- Support of predictive maintenance
- High degree of transparency due to integration in energy management systems, readout of current values and diagnostic messages
- Shorter changeover times due to central management of parameters and recipes, even for field devices

# Unrestricted dialog: the IO-Link system at Siemens



## Master modules

### SIMATIC ET 200S and SIMATIC ET 200eco PN

The IO-Link Master modules facilitate easy integration of switching devices and sensors, as well as the incorporation of intelligent IO-Link devices from various suppliers. The four-channel modules are designed for the connection of four IO-Link devices. The SIMATIC ET 200S is used in the control cabinet and the SIMATIC ET 200eco PN is used in the field.

## SIRIUS industrial switching

### SIRIUS 3RA6 compact starters

The SIRIUS 3RA6 compact starters are the first switching devices with IO-Link capability and intelligent control current wiring. As many as four SIRIUS compact starters (reversing and direct starters) can be arranged side-by-side and networked to the IO-Link Master by means of a standardized IO-Link connection. The significant reduction in control current wiring results in faster installation and a minimized error rate. The diagnostic data of the process determined by the SIRIUS compact starter, such as short-circuit, end of life and end position, are transmitted via IO-Link to the higher-level controller, in addition to being displayed on the compact starter itself.

### SIRIUS 3RA2 load feeders

The SIRIUS load feeders include the 3RA27 function modules for the simple control connection of load feeders up to 38 A. As many as four load feeders can be grouped as one IO-Link device. Within a group of four, any combination of direct, reversing and star-delta starters is possible. This not only results in an extensive individual diagnosis but also reduces the programming effort, since the process image for each type of starter is the same. SIRIUS 3RA2 load feeders replace complete control current wiring circuits and are available with an operating block for manual operation.

### SIRIUS 3UG48 and 3RS14/15 monitoring relays

The new SIRIUS relays for IO-Links monitor network quality, current values, voltage levels and speed (3UG4) as well as temperatures (3RS1) with the usual dependability. The communications interface via IO-Link facilitates an even wider range of applications by transferring measured values and other data to the control level. Due to support of the data formats defined in the PROFIenergy profile, the relays also make a contribution to efficient energy management. The devices can be parameterized either locally or via IO-Link. And thanks to data synchronization and automatic reparameterization, it is considerably easier to replace devices.

# Overview of our IO-Link system

				
<b>Products</b>	<b>Master modules</b>		<b>Industrial controls</b>	
			<b>Compact starter</b>	<b>Load feeder</b>
	<b>SIMATIC ET 200S 4SI</b>	<b>SIMATIC ET 200eco PN</b>	<b>Compact starter SIRIUS 3RA6</b>	<b>Function module SIRIUS 3RA27</b>
<b>Application Areas</b>	<ul style="list-style-type: none"> <li>• Connection of IO-Link devices to the I/O in the control cabinet</li> </ul>	<ul style="list-style-type: none"> <li>• Connection of IO-Link devices to the I/O directly in the field area at the machine</li> </ul>	<ul style="list-style-type: none"> <li>• Wherever AC current loads are to be switched or monitored</li> </ul>	<ul style="list-style-type: none"> <li>• Wherever AC current loads are to be switched</li> </ul>
<b>Properties</b>	<ul style="list-style-type: none"> <li>• IP20 degree of protection</li> <li>• Electronic module for the integration of the IO-Link devices into the ET 200S I/O system</li> <li>• Connection of 4 IO-Link devices</li> </ul>	<ul style="list-style-type: none"> <li>• IP67 degree of protection</li> <li>• Connection to PROFINET IO</li> <li>• Connection of 4 IO-Link devices</li> <li>• 8 digital inputs and 4 digital outputs</li> </ul>	<ul style="list-style-type: none"> <li>• Side-by-side connection of up to 4 starters (reversing and direct starters) to just one IO-Link channel</li> <li>• Direct connection to IO-Link Master via standardized IO-Link connection</li> </ul>	<ul style="list-style-type: none"> <li>• Side-by-side connection of up to 4 feeders (reversing and direct starters, star-delta) to just one IO-Link channel</li> <li>• Direct connection to IO-Link Master via standardized IO-Link connection</li> </ul>
<b>Product-specific IO-Link advantages</b>	<ul style="list-style-type: none"> <li>• High channel density and simple connection system for IO-Link devices with maximum flexibility in the control cabinet</li> </ul>	<ul style="list-style-type: none"> <li>• Compact cabinetless design with high degree of protection for the field-level connection of IO-Link devices and standard sensors and actuators</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of the control current wiring and bundling of large amounts of different information on one standardized IO-Link connection</li> <li>• In addition to the operating data: possible transmission of signal functions such as short-circuit, failure of contactor supply, end-of-life and end position</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced requirement for control current wiring and bundling of large amounts of different information on one standardized IO-Link connection</li> <li>• In addition to the operating data: possible transmission of signal functions such as short-circuit, failure of contactor supply, etc.</li> </ul>



		Modules	Software
<b>Monitoring relay</b>	<b>Overload relay</b>		
<b>SIRIUS 3UG48/3RS14/3RS15 monitoring relay</b>	<b>Overload relay SIRIUS 3RB24</b>	<b>IO-Link module K20 4DI/8DI</b>	<b>SIMATIC S7-PCT</b>
<ul style="list-style-type: none"> <li>Monitoring of electrical and mechanical values as well as temperatures for the protection of machinery and plants</li> </ul>	<ul style="list-style-type: none"> <li>These devices are designed for the current-dependent protection of loads with normal or heavy starting against unacceptably high heating as a result of overload, phase asymmetry or phase failure</li> </ul>	<ul style="list-style-type: none"> <li>Linking of binary sensors and encoders in all areas of product automation</li> <li>Replacement of sensor/actuator boxes by using IO-Link modules</li> </ul>	<ul style="list-style-type: none"> <li>Engineering of IO-Link master and devices</li> </ul>
<ul style="list-style-type: none"> <li>Monitoring of all electrical and mechanical values in the feeder</li> <li>Direct connection to the controller via standardized IO-Link connection</li> </ul>	<ul style="list-style-type: none"> <li>The electronic overload relay 3RB24 is designed for protecting AC, asynchronous and single-phase AC motors</li> <li>Direct connection to IO-Link Master via standardized IO-Link connection</li> </ul>	<ul style="list-style-type: none"> <li>4DI: Bundling of up to 4 binary sensors to one IO-Link port – via M12 connections, double-assigned</li> <li>8DI: Bundling of up to 8 binary sensors to one IO-Link port – via M8 connections</li> <li>Connection to the IO-Link Master via a standard M12 connecting cable</li> <li>Short-circuit and overload protection</li> <li>IP67 degree of protection</li> </ul>	<ul style="list-style-type: none"> <li>Stand-alone versions or integration into STEP 7 possible</li> <li>Integration via TCI</li> <li>Import of IO-Link-compliant device description files (IODD)</li> </ul>
<ul style="list-style-type: none"> <li>Device parameterization either locally or via IO-Link</li> <li>Central fault diagnostics and localization</li> <li>Easy commissioning and maintenance</li> <li>Data synchronization and automatic reparameterization</li> </ul>	<ul style="list-style-type: none"> <li>Control of drives directly via IO-Link of a higher-level controller</li> <li>Transmission of current values (phase current) directly via IO-Link</li> <li>Bundling of large amounts of different information on one standardized IO-Link connection</li> </ul>	<ul style="list-style-type: none"> <li>Inputs can be parameterized as NC or NO contacts</li> <li>Signaling of overload or short-circuit in the sensor supply</li> <li>Reduction of wiring and associated risk of wiring errors</li> <li>Can be used in harsh ambient conditions (IP67 degree of protection)</li> </ul>	<ul style="list-style-type: none"> <li>Online access to IO-Link devices</li> </ul>



### **SIRIUS 3RB24 electronic overload relay**

In addition to the proven properties of the SIRIUS 3RB22 electronic overload relay, the 3RB24 offers additional versatile functions for IO-Link. The transmission of current measurement values (phase currents) via IO-Link enables the SIRIUS 3RB24 overload relay to be integrated into higher-level energy management systems. By means of their extended diagnostic functions, the SIRIUS switching devices facilitate direct data transmission of diagnostic information via IO-Link to the automation level – such as information on overloading, grounding and thermistor motor protection shutdown.

The load feeder is linked to the higher-level controller and integrated into the automation environment by means of STEP 7.

### **I/O modules**

#### **IO-Link K20 modules**

With the aid of the K20 IO-Link modules, as many as eight binary sensors outside the control cabinet can be bundled together and connected via a 3-core connection to one IO-Link port. This means considerably less wiring expense and more free space in the control cabinet.

### **Software**

#### **SIMATIC S7-PCT**

SIMATIC S7-PCT provides an efficient and user-friendly engineering tool for configuring, commissioning and testing the IO-Link Master and devices. Together with STEP 7, it offers direct access to configuration, parameterization and testing of IO-Link Masters and devices. All available Siemens IO-Link components are already implemented in the selection catalog and further IO-Link devices can be integrated via a description file (IODD).

#### **Function block FB IOL\_Call**

User function block for the simple use of IO-Link data in the control program of SIMATIC S7.

#### **SIMATIC WinCC flexible faceplates**

The WinCC flexible faceplates enable the operation, monitoring and diagnosis of Siemens IO-Link devices with SIMATIC system mechanisms. Diagnostic messages can be displayed in plain text, for example. In the application, faceplates facilitate faster reading out of device information and parameters and make it easier to replace defective devices. They also support and simplify communication with Technical Support.

## Further information:

All you need to know about IO-Link

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