



IO-Link in general

Sensor Solutions

Motion Control

Vision Technologies

Process Instrumentation

IO-Link in general

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1 General information

1.1 Concerning the contents of this document

This manual contains information regarding the commissioning and communication of Baumer photoelectric sensors with the IO-Link interface. It is a supplement to the mounting instructions supplied with each sensor.

1.2 General information

Intended use	This product is a precision device and is used for object detection and the preparation and/or provision of values as electrical quantities for a subsequent system. Unless this product is specially labeled, it may not be used for operation in potentially explosive environments.
Commissioning	Installation, mounting and adjustment of this product may be performed only by a qualified person.
Mounting	For mounting, use only the mechanical mountings and mechanical mounting accessories intended for this product. Unused outputs must not be wired. In cable versions with unused cores, these cores must be insulated. Do not exceed admissible cable bending radii. Prior to electrical connection of the product, the system must be disconnected from the power supply. In areas where screened cables are mandatory, they must be used as protection against electromagnetic disturbances. If plug connections to screened cables are made by the customer, an EMC version of the connectors should be used, and the screen must be connected to the connector housing across a large area.

2 IO-Link introduction

These operating instructions contain a description of the most important aspects of the IO-Link interface which are required for understanding the configuration options. For detailed information about IO-Link and all specifications, go to www.io-link.com.

IO-Link is a standard interface for sensors and actuators. The device (sensor, actuator) and IO-Link master are interconnected as a point-to-point connection. Communication between master and device takes place bi-directionally via the device connecting line. Via this interface values can be read out and it is possible to configure the sensor via IO-Link. The sensor can be operated in two modes: standard input/output mode (SIO mode) and IO-Link communication mode.

The master switches the sensor to IO-Link communication mode. In this mode, process data are continuously sent from the sensor to the master and demand data (parameters, commands) are written to the device or read off it.

2.1 SIO mode

After start-up the sensor is in SIO mode. In this mode the sensor functions as a normally switching sensor. On the master side the IO-Link port is switched as a normal digital input. The sensor can be used like a standard sensor without IO-Link. Diverse functions can, however, only be controlled via IO-Link.

2.2 IO-Link communication mode

With a so-called "wake-up" the sensor is switched by the master into "communication mode". In the process the master attempts to find a connected device through a defined signal on the switching line. If the sensor responds, communication parameters are exchanged and afterwards cyclical transmission of process data is initiated.

In IO-Link communication mode:

- Process data can be read.
- Parameters (SPDUs) can be read off the sensor.
- Parameters (SPDUs) can be written to the sensor.
- Commands can be sent to the sensor (e.g. teaching the switching point, restoring to factory setting, etc.).

In the process data cyclical data such as outputs or quality data are transmitted to the superordinate control. The master can leave the IO-Link communication mode again with a "fall back", and the sensor continues to operate in SIO mode until a new "wake up".

In IO-Link communication mode, sensor behavior can be adjusted in SIO mode so that the sensor can easily be parameterized according to requirements and then operate as a "normal" sensor without the IO-Link master. Alternatively, the sensor can also be operated in IO-Link communication mode, enabling use of the full range of functions via process data.

2.3 IODD (IO-Link device description)

The IODD describes the IO-Link device and can be downloaded at www.baumer.com. It consists of a set of XML and PNG files. An engineering tool or diagnosis tool reads the IODD of a sensor and therefore knows its:

- Identification (manufacturer, designation, article number, etc.)
- Communication characteristics (communication speed, frame type, etc.)
- Parameters and commands
- Process data
- Diagnosis data (events)

Sensor data that can be viewed and changed is defined by the IODD. The manner of data representation and manipulation is defined by the control manufacturer and is therefore sensor-independent.

3 Sensor in SIO mode

In SIO mode the sensor operates according to the factory settings or the settings adjusted by the user via IO-Link. The range of functions in SIO mode is sensor-specific.

4 Sensor in IO-Link communication mode

4.1 Process data

If the sensor is in IO-Link communication mode, data are periodically exchanged between the IO-Link master and the device. These data consist of process data and possible commands and parameters to the sensor. In the process data the current measuring value and status bits like output, quality data, etc. are transmitted to the master. The process data do not have to be explicitly queried by the master.

4.1.1 Process data structure

The process data structure is shown in the manual of the sensor

4.2 Parameters and commands

Parameters and commands are written to the device or read off the device via SPDU (Service Protocol Data Unit) indices. The read and write function of indices is provided by the IO-Link master. The user can write a value into an index or read a value off an index.

4.2.1 Product data

Some parameters contain product information like manufacturer's name, product name, and number, plus room for a user-specific designation of the sensor.

4.2.2 Parameters

For a description of the parameters are shown in the manual of the sensor.

The following settings are possible via parameters:

- Setting the switching point (numerical or manual teach-in)
- Defining the output state (light or dark switching)
- Selecting a teach-in function
- Setting a delay function at the switching output. Value range from 1 to 1000 ms
- Defining the threshold for the dust indicator

4.2.3 Commands

Commands are written to SPDU index 0x02 (system command). The commands are shown in the manual of the sensor

The following settings can be made via commands:

- Teach-in of the switching point
- Save changed parameters
- Restore to factory settings

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