Digitization starts with the sensor
Simply use valuable additional data via IO-Link.
More information and more effective processes with digital sensor data.

Baumer sensors precisely record many different measured values. Valuable additional information is already generated during the processing of the measured values in the sensor. Standardized digital communication interfaces such as IO-Link can be used to access that information and significantly optimize your processes.

Easy integration and maximum flexibility with IO-Link

IO-Link is an IO technology standardized worldwide according to IEC 61131-9. It permits manufacturer-independent digital, bidirectional point-to-point communication. For this purpose, sensors are connected to the IO-Link master via standardized 3-wire plug-in cables. IO-Link is available for various sensor technologies and can also be integrated into small miniature sensors.

With the IO-Link master, which bundles several sensors, the connection to the controller is made via the respective fieldbus system. In addition, an Ethernet-based connection (with OPC UA) from the master allows direct communication from the sensor to IT systems. The maximum cable length between sensor and master is 20 m. However, significantly longer connections from the sensor to the controller can be realized by connecting a field master to a field bus system. This gives them maximum flexibility in the connection solution.

Additional data through digital sensor connection

Data is the most important basis for process and product optimization. With the help of IO-Link, valuable additional data can be made accessible:

**Cyclic data** transmitted in real time. They are used for process control in the automation system. These can also be transferred to other IT systems via IO-Link.

**Acyclic data** enable sensors (IO devices) to be parameterised and, if required, diagnostic and identification data to be read out.

**Measured distances, switching states or counters can be digitally processed and evaluated**

**Signal quality, sensor temperature, and usage information are recorded**

**Data for sensor identification, such as sensor type, serial number, device parameters with value range and default value**

**Data for sensor parameter adjustment can be stored and quickly replicated**
Your benefit of digitized sensor connection

**Cost-effective & securely connected**
- Connection between sensor and IO-Link master via 3-wire standard cable
- Manufacturer-independent, international communication standard
- Digital signals are transmitted to the controller loss-free and without conversion effort

**Simple & safe operation**
- Intuitively visualized sensor setting and function monitoring via smartphone, tablet or PC
- Direct integration into engineering tools
- Access block for local parameterization possible

**Extended settings**
- IO-Link offers additional functions and settings such as free selection of switching points, adjustable measuring ranges and filter functions, and much more. This allows the sensor to be configured precisely and reliably to the application.

**Fast sensor exchange**
- Automated parameter transfer for sensor replacement

**Increased flexibility**
- Simple re-parameterization during format or recipe changes during production operation enables high flexibility with maximum machine utilization

**Additional data**
- Transparency through process data that can also be easily evaluated in IT systems.
- Diagnostic data for monitoring plant and sensor states, e.g. for predictive maintenance.
- Identification and parameter data can also be directly evaluated digitally
Using digital communication interfaces across technologies — Baumer offers a wide range of sensors with IO-Link.

Object detection and distance measurement

O200, O300, O500 and series 14 light barriers and diffuse sensors in plastic and stainless steel housing – the standard with extra power for your application.

Ultrasonic UxDK 09 miniature sensors and US00 / UR18 – robust and economical object detection independent of colour, shape and transparency.

AlphaProx inductive distance sensors with the sizes ø 6.5 mm, M8, M12, M18 and M30 for object recognition and micrometer-accurate measurement of distances.

IO-Link masters are available as field masters, USB masters or wireless masters.

Process sensors

FlexFlow PF20H / PF20S sensors for efficient monitoring of flow velocity and media temperature.

Level switches LBF1 / LBFH – simple and universal level detection for all media.

Hygienic pressure sensors PP20H – multi-purpose for demanding applications in the food and pharmaceutical industries.

Conductivity sensors CombiLyz® AFI – precise analysis and exact differentiation of fluid media.

More information about our portfolio with IO-Link can be found at:
www.baumer.com/io-link

Find your local partner: www.baumer.com/worldwide

Baumer
Passion for Sensors

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sales@baumer.com · www.baumer.com
Digitization starts with the sensor

Feature overview IO-Link
## Connection / transmission

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<th>Device profile</th>
<th>I/O-Link port type, power consumption (max.)</th>
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</thead>
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<tr>
<td></td>
<td>M8 4-Pin or cable 4-Pol, unshielded</td>
</tr>
<tr>
<td></td>
<td>M8 4-Pin or cable 4-Pol, unshielded</td>
</tr>
<tr>
<td></td>
<td>M12 4-Pin or cable 4-Pol, unshielded</td>
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<tr>
<td>Connection type</td>
<td>V 1.1</td>
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<tr>
<td>Baud rate</td>
<td>230.4 kbaud (COM 3)</td>
</tr>
<tr>
<td>Cycle time</td>
<td>0.6 ms</td>
</tr>
<tr>
<td>Process data length</td>
<td>32 bit</td>
</tr>
<tr>
<td>Cable length to master (max)</td>
<td>20 m</td>
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<tr>
<td>SIO mode / DI / DQ mode</td>
<td>-</td>
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<td>Dual Channel</td>
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<tr>
<td>Transmission quality / security</td>
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</tr>
<tr>
<td>Identification</td>
<td>IODD</td>
</tr>
<tr>
<td>Identification date</td>
<td>Electronic device description in the automation system – prevents, among other things, connection of an incorrect sensor. Download in the IODD finder or at <a href="http://www.baumer.com">www.baumer.com</a> with the product</td>
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<tr>
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<td>Stored parameters for sensor swap</td>
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<td>Find-me function</td>
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<tr>
<td>Configurable parameters</td>
<td>Switching points or switching window for object detection or counter, output logic, switch-on / switch-off delay, measured value filter, SSC / output assignment, LED behavior, Teach possibilities</td>
</tr>
<tr>
<td></td>
<td>Switching point (mm / intensity), output logic, on / off delay, teaching possibilities, quality bit limit value, qTeach® locking</td>
</tr>
<tr>
<td></td>
<td>Switching point (mm), measuring range (FADx 14), output logic, on / off delay, teaching possibilities, quality bit limit value, qTeach® locking</td>
</tr>
<tr>
<td>Process data</td>
<td>Process data, cyclically transmitted in real time</td>
</tr>
<tr>
<td>MDC = Measuring values</td>
<td>MDC: Signal reserve, intensity or counter</td>
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<td>SSC = Switching signals</td>
<td>SSC1: Detection</td>
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<td>SSC4: Counter</td>
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<td>Quality Bit (Process parameter)</td>
<td>Excess gain</td>
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<td>Alarm Bit (device defect)</td>
<td>Excess gain</td>
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<td>Diagnosis</td>
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<td></td>
<td>Signal reserve</td>
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<td>Signal reserve</td>
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</table>
## Object detection and distance measurement

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<tbody>
<tr>
<td><strong>Series 14</strong></td>
<td>Series 09</td>
<td>U500, UR18</td>
</tr>
</tbody>
</table>

### Smart sensor profile

- **Class A, 24 V, max. 200 mA**
- **M12 or M8 4-Pin or cable 4-Pol, unshielded**
- **M8 4-Pin or cable 4-Pol, unshielded**
- **M12 5-Pin, unshielded**
- **M8 3-Pin oder M12 4-Pin, unshielded**

- **V 1.0**
- **V 1.0**
- **V 1.1**
- **V 1.1**

- **38.4 kbaud (COM 2)**
- **38.4 kbaud (COM 2)**
- **38.4 kbaud (COM 2)**
- **230.4 kbaud (COM 3)**

- **10 ms**
- **20 ms**
- **10 ms**
- **0.6 ms**

- **16 bit**
- **12 bit**
- **32 bit**
- **32 bit**

- **20 m**

- **Connection / transmission**
  - **Device profile**
  - **Smart sensor profile**
  - **IO-Link port type, power consumption (max.)**
    - **Class A, 24 V, max. 200 mA**
  - **Connection type M8 4-Pin or cable 4-Pol, unshielded**
  - **M12 4-Pin or cable 4-Pol, unshielded**
  - **M8 3-Pin oder M12 4-Pin, unshielded**
  - **M12 5-Pin, unshielded**
  - **M8 3-Pin oder M12 4-Pin, unshielded**

- **IO-Link version**
  - **V 1.1**
  - **V 1.1**
  - **V 1.1**
  - **V 1.0**
  - **V 1.1**
  - **V 1.1**

- **Baud rate**
  - **230.4 kbaud (COM 3)**
  - **38.4 kbaud (COM 2)**
  - **38.4 kbaud (COM 2)**
  - **38.4 kbaud (COM 2)**
  - **38.4 kbaud (COM 2)**
  - **230.4 kbaud (COM 3)**

- **Cycle time (min.)**
  - **0.6 ms (O300.DL)**
  - **2.3 ms / 2.7 ms**
  - **10 ms**
  - **20 ms**
  - **10 ms**
  - **0.6 ms**

- **Process data length**
  - **32 bit**
  - **8 bit / 24 bit**
  - **16 bit**
  - **12 bit**
  - **32 bit**
  - **32 bit**

- **Cable length to master (max.)**
  - **20 m**

- **Identification**
  - **IODD**
  - **Electronic device description in the automation system**
  - **Prevents, among other things, connection of an incorrect sensor.**
  - **Download in the IODD finder or at www.baumer.com with the product designation, serial number, hardware and firmware version as well as freely usable application designation.**

- **Configuration**
  - **Off-line parameterization**
    - **With SPS Engineering Tool**
  - **Stored parameters for sensor swap**
  - **Simple configuration changes**
  - **Find-me function**
  - **Configurable parameters**
    - **Switching points or switching window for object detection or counter, output logic, switch-on / switch-off delay, measured value filter, SSC / output assignment, LED behavior, teaching facilities.**
    - **Switching points or switching window for distance, measuring range, averaging, temperature compensation, teach-in lock.**
    - **Switching points or switching windows for distance or counter, measuring range, sound beam, averaging, temperature compensation, output logic, switching hysteresis, input / output logic, switch-off delay, output circuit, SSC / output assignment, LED behavior, teaching facilities.**
    - **Switching points or switching window for distance, frequency or counter, measuring range, output logic, switching hysteresis, input / output logic, switch-off delay, output circuit, measured value filter, SSC / output assignment, LED behaviour, teaching options.**

- **Process data**
  - **MDC = Measuring values**
  - **SSC = Switching signals**
  - **MDC: Signal reserve, intensity or counter**
  - **SSC: Distance, sensitivity**
  - **MDC: Distance (Ox00.Dx)**
  - **SSC: Distance, sensitivity**
  - **MDC: Distance (FADx 14)**
  - **SSC: Distance**
  - **MDC: Distance**
  - **SSC: Distance**
  - **MDC: Distance, counter**
  - **SSC: Distance, counter**
  - **MDC: Distance, frequence, counter**
  - **SSC1: Distance, frequence, counter**
  - **SSC2: Distance, frequence, counter**

- **Quality Bit (Process parameter)**
  - **Excess gain**

- **Alarm Bit (device defect)**

- **Diagnosis**
  - **Additional data, cyclically retrievable**
  - **Switching cycles, device temperature, signal reserve**

- **Switching cycles, operating time, boot cycles, histograms of process data values and the operating voltage and device temperature**

- **Switching cycles, operating time, boot cycles, histograms of process data values and the operating voltage and device temperature**
<table>
<thead>
<tr>
<th>Process instrumentation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flow sensors</strong></td>
<td><strong>Level measurement</strong></td>
</tr>
<tr>
<td>PF20</td>
<td>LBFI, LBFH</td>
</tr>
</tbody>
</table>

### Connection / transmission

<table>
<thead>
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<th>Device profile</th>
<th>Smart sensor profile</th>
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<tbody>
<tr>
<td><strong>IO-Link port type, power consumption (max.)</strong></td>
<td>Class A, 24 V, max. 200 mA</td>
</tr>
<tr>
<td>Connection type</td>
<td>M12 4-Pin, unshielded</td>
</tr>
<tr>
<td><strong>IO-Link version</strong></td>
<td>V 1.1</td>
</tr>
<tr>
<td>Baud rate</td>
<td>38.4 kbaud (COM 2)</td>
</tr>
<tr>
<td>Cycle time (min.)</td>
<td>3.2 ms</td>
</tr>
<tr>
<td>Process data length</td>
<td>32 bit</td>
</tr>
<tr>
<td>Cable length to master (max)</td>
<td>20 m</td>
</tr>
<tr>
<td><strong>SIO mode / DI / DQ mode</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Dual Channel</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Transmission quality / security</strong></td>
<td>Increased transmission reliability – up to 3 frame repetitions, active signalling</td>
</tr>
</tbody>
</table>

### Identification

| IODD | Electronic device description in the automation system – prevents, among other things, connecting incorrect sensors. Download in the IODD finder or at www.baumer.com with the product code |
| Identification date | Manufacturer, product image, product designation, serial number, hardware and firmware version |

### Configuration

<table>
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<tr>
<th>Off-line parameterization</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>With SPS Engineering Tool</strong></td>
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</tr>
<tr>
<td>Stored parameters for sensor swap</td>
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<tr>
<td>Simple configuration changes</td>
<td></td>
</tr>
<tr>
<td>Find-me function</td>
<td></td>
</tr>
<tr>
<td><strong>Configurable parameters</strong></td>
<td></td>
</tr>
<tr>
<td>Output: Temperature or flow, analog or switching, unit, 2 switching points / switching window, switching hysteresis, on / off delay, filter, scaling, output circuit, output logic (NO / NC)</td>
<td>Output: 2 switching points / switching window, switching hysteresis, on / off delay, output circuit, output logic (NO / NC)</td>
</tr>
</tbody>
</table>

### Process data

<table>
<thead>
<tr>
<th>Process data, cyclically transmitted in real time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MDC = Measuring values</strong></td>
<td><strong>SSC = Switching signals</strong></td>
</tr>
<tr>
<td>MDC: Flow rate, temperature</td>
<td>SSC1: Flow rate, temperature</td>
</tr>
<tr>
<td>SSC1: Flow rate, temperature</td>
<td>SSC2: Flow rate, temperature</td>
</tr>
<tr>
<td>SSC2: Flow rate, temperature</td>
<td><strong>MDC: pressure measuring value or process temperature value</strong></td>
</tr>
</tbody>
</table>

### Alarm Bit (device defect)

| Quality Bit (process parameter) | Alarm Bit (device defect) |  |
| Flow unstable | Media suitability |  |

### Diagnosis

<table>
<thead>
<tr>
<th>Additional data, acyclically retrievable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature value pressure measuring cell (process temperature), zero point adjustment, serial number, 3 tags, device status, pressure switch point, MDC selector (pressure/temperature), barometric pressure, current device temperature, CPU temperature, time since last power-up</td>
<td>Temperature value pressure measuring cell (process temperature), zero point adjustment, serial number, 3 tags, device status, pressure switch point, MDC selector (pressure/temperature), barometric pressure, current device temperature, CPU temperature, time since last power-up</td>
</tr>
<tr>
<td>Conductivity sensor</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>AFix</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M12, 5-pin, unshielded, PG Gland</th>
</tr>
</thead>
<tbody>
<tr>
<td>V 1.1</td>
</tr>
<tr>
<td>COM 2</td>
</tr>
<tr>
<td>38.4 kbaud (COM 2)</td>
</tr>
<tr>
<td>8.4 ms</td>
</tr>
<tr>
<td>128 bit</td>
</tr>
</tbody>
</table>

- Increased transmission reliability – up to 3 frame repetitions, active signalling of communication errors
- Identification
  - IODD: Electronic device description in the automation system – prevents, among other things, connection of an incorrect sensor.
  - Download in the IODD finder or at www.baumer.com with the product
  - Manufacturer, product image, product designation, serial number, hardware and firmware version as well as freely usable application designation

- Configuration
  - Off-line parameterization
    - With SPS Engineering Tool
  - Stored parameters for sensor swap
  - Simple configuration changes
  - Find-me function
  - Configurable parameters
    - Output: Temperature or flow, analog or switching, unit, 2 switching points / switching window, switching hysteresis, on / off delay, filter, scaling, output circuit, output logic (NO / NC)

- Process data
  - MDC: Measuring values
    - Flow rate, temperature
  - SSC: Switching signals
    - SSC1: Flow rate, temperature
    - SSC2: Flow rate, temperature
  - SSC1: Filling level 1
  - SSC2: Filling level 2
  - MDC: Pressure measuring value or process temperature value
  - MDC: Analog output 1, analog output 2, media temperature, temperature unit, conductivity, concentration, measuring range
  - SSC: Conductivity, concentration or temperature

- Quality Bit (process parameter) Flow unstable Media suitability

- Alarm Bit (device defect)

- Diagnosis
  - Additional data, acyclically retrievable
    - Temperature value pressure measuring cell (process temperature), zero point adjustment, serial number, part number, 3 tags, device status, pressure switch point (pressure/temperature), pressure/temperature, current ambient temperature, current ambient pressure, barometric pressure, current device temperature, CPU temperature, time since last power-up, current ambient pressure, detailed device status (short-circuit, IO-Link maintenance, cable break, excess temperature)
IO-Link connectivity

*SensControl*: Wireless IO-Link master
- Visualization and parameterization of sensors
- Integrated WLAN and bluetooth LE
- Power supply via rechargeable battery
- Simple operation via *SensControl* App

IO-Link master portfolio
- Connection of sensors to the fieldbus level and PLC
- 8 port master for field use and control cabinet
- Parameterization via user-friendly web interface
- Ethernet/IP or profinet interface

USB IO-Link master
- Access to sensors via USB on the PC
- Operation via IO-Link device tool software
- Includes power supply (EU, KOR, USA, AUS, UK) and USB cable

Cables
- Angled or straight female connector
- Sheath material: PUR, PP, PVC, PE-X or RADOX
- Ecolab certified, FDA compliant variants
- Halogen-free variants