



IO-Link - Breakthrough in communication technology-

“Last Mile Problem”

Author: Dipl.-Ing. (FH) Wolfgang Klaus, Product Manager in the business unit “Optoelectronic sensors” at Leuze electronic.

Sensors and actuators on the lowest operating level have long since been invested with their own intelligence and with the ability to supply wide-ranging types of information. But despite the diversity of available configurations and interface technologies, what has been missing to date has been an economical solution to address the issue of continuous communication right down to the lowest field level. With the introduction of IO-Link, a standardized interface will be available in the future with the ability to make this type of information easily accessible using conventional 2/3 wire standard parallel wiring.

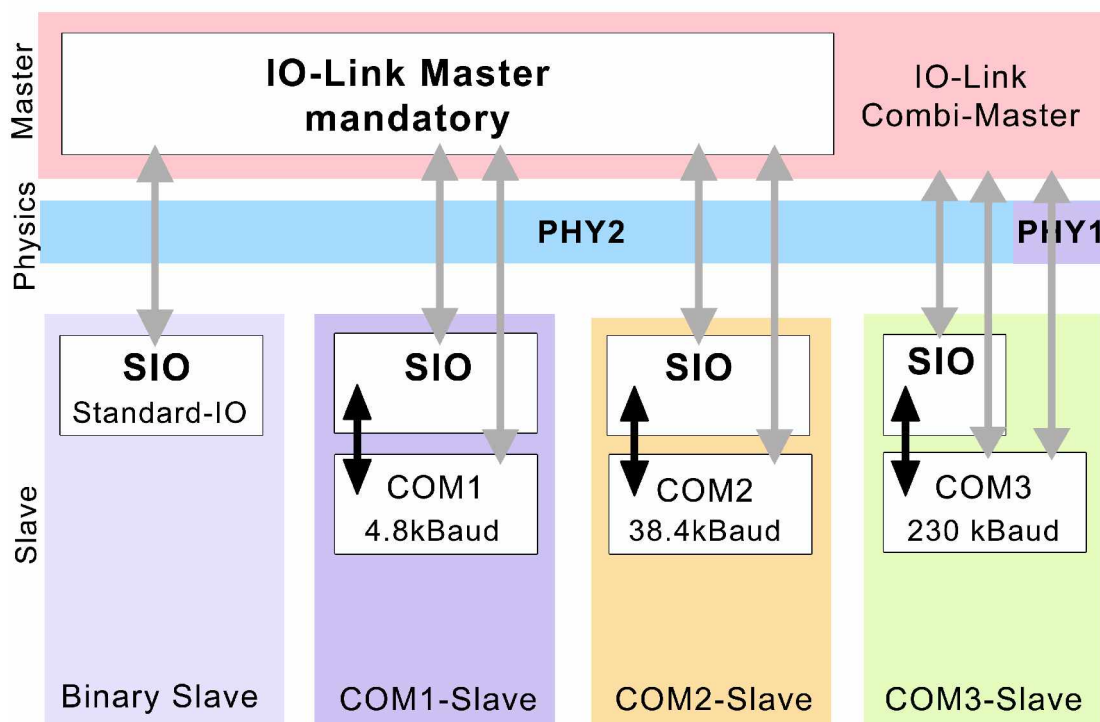
The customary “standard” IO wiring used currently in binary switching sensors comprises a power supply line and a separate conductor for transmission of the sensor’s switching signals to the control system. Using the current technology, additional information supplied by the sensor, such as signals warning of contamination build-up, cannot be transmitted to the control system without incurring additional wiring work and requiring additional interfaces. Not only are the standards used for this type of application cost-intensive and susceptible to defects, the standard IOs customarily used today are also unidirectional, i.e. the control system is unable to communicate sets of parameters to the sensor. Any parameterization work is performed while the machine is at a standstill, generally via proprietary interfaces using a device such as a laptop, and also frequently entails the use of special plugs and special cables.

In a bid to achieve even this very minimal scope for communication, a number of manufacturers in the sensor, drive engineering and control engineering sectors have signed up to development of the new communication standard “IO-Link” which not only operates bidirectionally but also allows for structured communication models for complex sensors.



Use of proven 3-wire technology

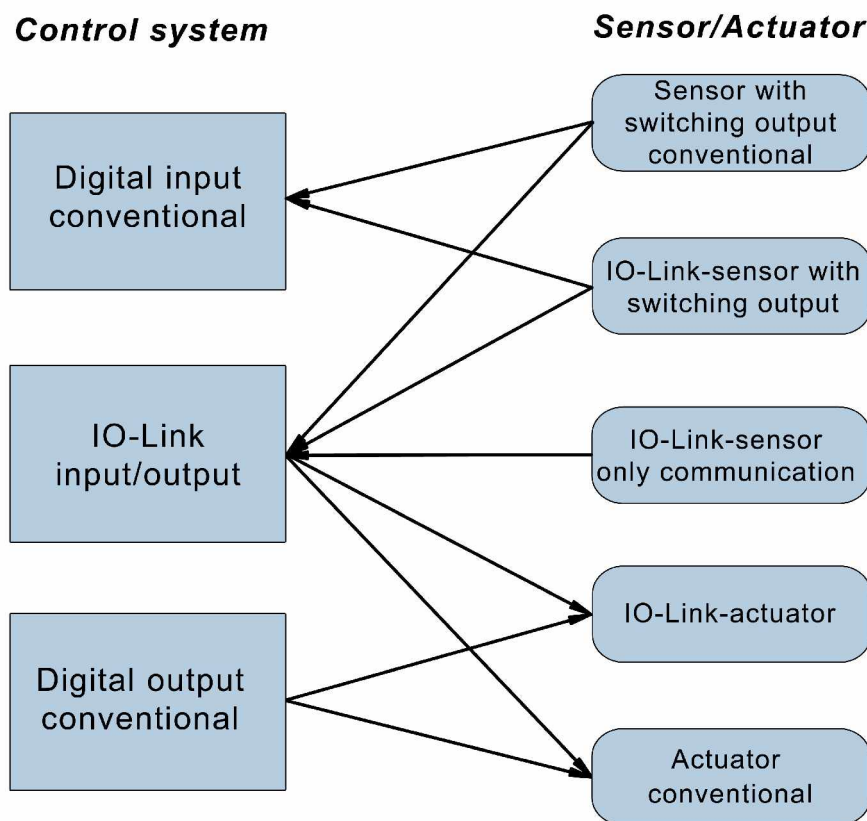
The interfaces developed within this working group for use with sensors and actuators with binary, analogue or digital interface, are based on conventional standard parallel wiring systems. They are used as serial, bidirectional communication interfaces for point-to-point connection with a single master and a single slave. Using proven 3-wire technology, all previously deployed PNP sensors and actuators can be connected to the new IO-Link interfaces. In addition, beyond the switching output with real time capability currently on offer, future capability is set to include serial parameterization, diagnostic and process communication (COM1 with 4.8 kBaud). Given sufficiently fast sensor response times, it will be possible to exchange parameter and diagnostic data bidirectionally, which will also allow proprietary interfaces to be substituted. As a quasi-replacement for analogue interfaces, the technology will also offer scope for the use of sensors and actuators with continuous communication (COM2 with 38.4 kBaud), saving costly analogue interfaces and the complex, partially shielded wiring technology these entail. IO-Link consequently offers a standardized wiring concept for binary, digital and analogue sensors and actuators.





Investment security through reverse compatibility

One of the essential characteristics of the IO-Link system is its full reverse compatibility to existing binary switching standard sensors. Users can benefit from the new system at any time without compromising any of the previously available performance features. The result: investment security through successive system immigration. Intelligent sensors and actuators working as IO-Link slaves help enhance system performance by providing additional information in fields such as diagnostics, error detection and analysis or messages relating to temperatures, degrees of contamination and much more. Machine downtimes can be minimized through the use of sophisticated standardized diagnostics, simplified fault localization and plant monitoring through to the lowest sensor / actuator level.



By providing standardized interfaces, the IO-Link system makes a major contribution to minimizing project processing input and commissioning time. The integrated parameterization capacity also has an important role to play here. Standard procedures for higher-level data maintenance also help cut down on set-up times and simplify the exchange of sensors. By consolidating binary and analogue sensor / actuator signals and using standard parallel wiring, installation costs can be substantially reduced. IO-Link is



not a bus system and consequently requires neither special bus topologies nor addressing of devices or special sensors.

IO-Link is currently being prepared for standardization. IO-Link masters will be available in the future in the form of coupling modules, gateways, PLC/IPC plug-in cards, compact controllers etc. as well as sensors and actuators as IO-Link slaves. Connection is possible using standard 2/3-pole unshielded sensor cables in line with IEC 60947-5-2.